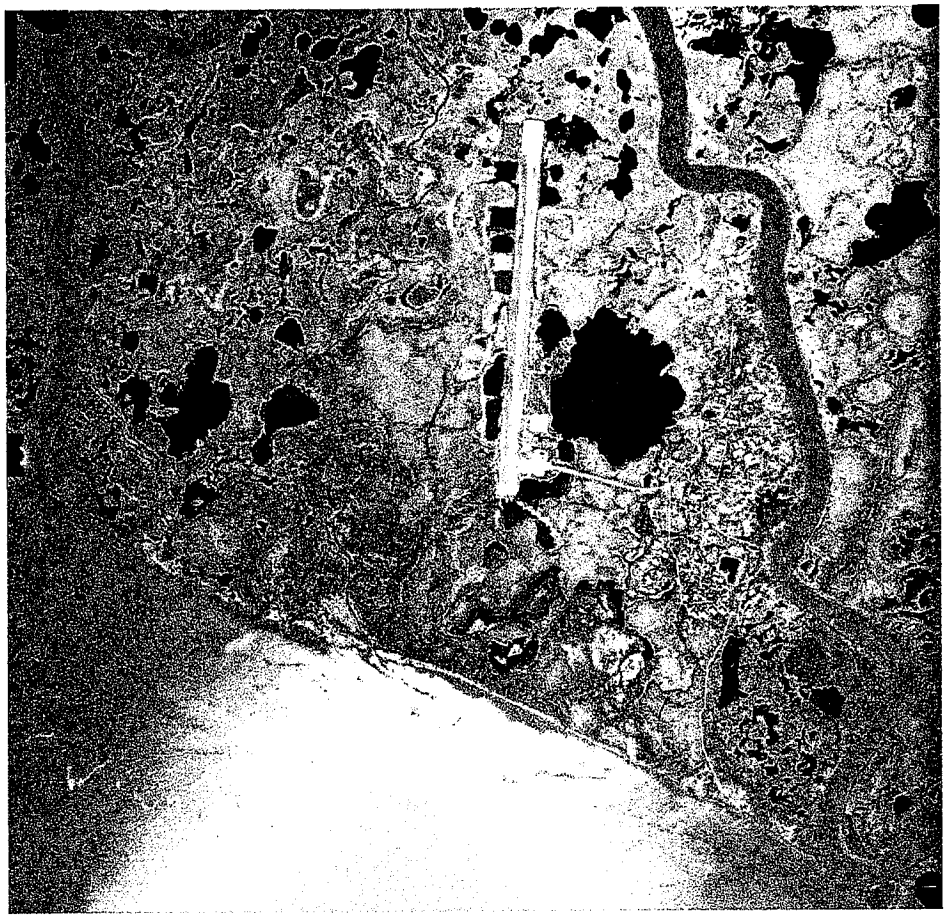
State of Alaska
Alaska Energy Authority, Rural Energy Group

CONCEPTUAL DESIGN REPORT



NEWTOK
POWER PLANT UPGRADE

Draft

March 7, 2002

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EXECUTIVE SUMMARY

This report has been prepared for the State of Alaska, Alaska Energy Authority (AEA), Rural Energy Group. Its purpose is to provide the basis for a new power plant with an associated schedule and cost estimate for the community of Newtok, Alaska.

The report includes a review of the existing power plant, an analysis of future needs, a conceptual design to meet these needs, a proposed project schedule, and a budget cost estimate for the project.

The participants in the proposed power generation facility include:

- Newtok Corporation
- Newtok Village (Traditional Council)
- Ungusraq Power Company (UPC)

The existing power plant has a potential power generation capacity of 372.5 kW from three generators with individual capacities of 122.5 kW, 125 kW; and 125 kW. All three of the generators have high hours of use: Generator No. 1, 52,000 hours; Generator no. 2, 58,000 hours; and Generator No. 3, 30,000 hours. These existing power generators are located in a wood building on post and pad foundation. The building is poorly lighted and ventilated and has no security locks. The wood flooring is soiled from fuel and oil. The only fuel storage for the power plant is a 300 gallon day-tank that is refilled almost daily using 55 gallon drums that are filled at the company's bulk fuel tanks at the extreme north end of the village, then transported over the boardwalk to the power plant. There is evidence of apparent oil and fuel spills in, under and around the building. Power outages occur as frequently as 1 to 3 times per week. In general the facility is in poor condition. The existing power generation facility does have a waste heat recovery system, providing heat for the water tank. The village would like to continue to use the waste heat. Because of the poor condition of the existing power plant, poor reliability, and lack of capacity for future expansion, the existing power plant should be replaced.

Once it was determined that a new power plant was needed, the process to select a site began. The site selection process involved reviewing pertinent public documents, consulting with community leaders, and conversations with government agencies. The community held two public meetings to discuss the best location for the new power plant, (see Appendix A). The community would like the new power plant to be located at the same location or near the existing power plant. This would keep the power plant adjacent to the water tank and water treatment/washeteria facility and allowing these facilities to benefit from a modern waste heat recovery system. This site also does not appear to have any special site control issues. There is not any evidence of historical use by others that could make a claim for this property. This site will require working with the Newtok Corporation to obtain site control. Because this site location has the support of the village and no special land or engineering problems, it has been selected as the location of the new power plant.

This site and any other sites within the existing village do share a common problem. A significant erosion problem may someday threaten the village. The Ninglick River south of the village has been creeping towards the village for years. A report by Woodward/Clyde dated February 24, 1984 entitled "Ninglick River Erosion Assessment" stated the village could be threatened in 25 to 30 years. Because of this threat, the community would like to move the village to Nelson Island. However at this time, no plan or financing is in place to allow for the relocation of the village.

The proposed power plant facility will occupy a site approximately 90 feet by 110 feet. The proposed power plant building is a metal structure 30 feet by 48 feet on piling. In addition to the new power plant building, a 12,000 gallon intermediate fuel tank will be placed 20 ft from the building. This intermediate tank will be connected to a fuel line running from the existing tank farm.

The proposed capacity of the new power generation-facility is 530 kW, using four generators and represents a 42% increase in capacity. The new generators and their sizing will allow Ungusraq Power Company to meet the power needs of the entire community for the next ten year including the school. If the growth of the community exceeds this projection, the proposed power plant is designed to allow for additional capacity by adding to the power plant's capacity or augmenting with alternative power sources.

The total Budget Cost Estimate for the new power plant is $1,538,040. This estimate includes the costs for: design, construction administration, permitting, regulatory plans, construction costs and a 20% construction contingency.

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I. INTRODUCTION

This report has been prepared for the State of Alaska, Alaska Energy Authority (AEA), Rural Energy Group, to identify the design basis for the development of a new power generation facility in the community of Newtok, Alaska.

This report includes a review of the existing power generation facility in the community, an analysis of future power needs, a conceptual design for a new power plant, a proposed project schedule and a budget cost estimate for the project.

An engineering investigation was made from existing photographs and design documents. The investigation included a review of overhead and oblique aerial photographs, existing surveys, and design documents. The investigation also included conversations with community leaders.

A. CONTACTS

Information for this report was gathered from the following people:

Jim Patterson	Village Safe Water	(907) 729-3561
Lenny Landis	AIDEA/AEA	(907) 269-4684
Kris Noonan	AIDEA/AEA	(907) 269-4697
Stanley Tom	Newtok Traditional Council	(907) 237-2314
Paul Charles	Ungusraq Power Company	(907) 237-2177
Larry Charles	Newtok Corporation	(907) 237-2512
Kristy Miller	DCED	(907) 269-4567
Keith Jost	DCED	(907) 269-4548
Harlan Legare	Corp of Engineers	(907) 753-2610
Dave Williams	Corp of Engineers	(907) 753-5621
Paul Liedberg	US Fish & Wildlife Service	(907) 543-1003
Joe Killeen	AVCP	(907) 543-3121

B. APPLICABLE REGULATIONS AND CODES

The design and operation of new power plant and the associated fuel systems is controlled by the following State and Federal regulations:

- State of Alaska Fire and Life Safety Regulations (13 AAC 50);
- 2000 International Fire Code as adopted by 13 AAC 50;
- 2000 International Building Code as adopted by 13 AAC 50;
- EPA Oil Pollution Prevention Regulations (40 CFR Part 112);
- ADEC Air Quality Regulations (18 AAC 52)
- Regulatory Commission of Alaska (RCA) Certification (3 AAC 42.05.221)

The current State of Alaska Fire and Life Safety Regulations adopted the 2000 editions of the International Fire Code (IFC) and the International Building Code (IBC). The code requirements of the IFC establish the primary design requirements for new facilities.

The State of Alaska Air Quality Regulations applies to emission generating equipment. The facility will require certification from RCA prior to initial use.

The US Environmental Protection Agency (EPA) Spill Prevention Control and Countermeasures Plan (SPCC) identifies minimum fuel facility requirements for above ground tanks larger than 660 gallons, or which have an aggregate volume of more than 1,320 gallons.

II. EXISTING POWER GENERATION FACILITY

A. FACILITY DESCRIPTION

The Ungusraq Power Company operates the power plant providing electricity to the community except for the new school and the old BIA school which both have their own power generators. The Power Plant is located on the south side of the community, adjacent to the water tank and water treatment building, (see the Conceptual Design Drawings, Appendix E). The generators are supplied with fuel from the Newtok tank farm located at the north end of the village.

The existing power plant has a potential power generation capacity of 372.5 kW from three generators with individual capacities of 122.5 kW, 125 kW; and 125 kW. All three of the generators have high hours of use: Generator No. 1, 52,000 hours; Generator no. 2, 58,000 hours; and Generator No. 3, 30,000 hours. These existing power generators are located in a wood building on post and pad foundation. The building is poorly lighted and ventilated and has no security locks. The wood flooring is soiled from fuel and oil. The only fuel storage for the power plant is a 300 gallons day-tank that is refilled almost daily using 55 gallon drums that are filled at the company's bulk fuel tanks at the extreme north end of the village, then transported over the boardwalk to the power plant. There is evidence of apparent oil and fuel spills in, under and around the building. It has been reported that power outages occur 1 to 3 times per week. In general the facility is in poor condition. The existing power generation facility has a waste heat recovery system, providing heat for the water tank. Because of the poor condition of the existing power plant, poor reliability, and lack of capacity for future expansion, the existing power plant should be replaced.

B. EXISTING POWER GENERATION CAPACITY SUMMARY

The following table lists the existing total power generation capacity.

Existing Total Power Generation Capacity

Generator	Capacity (KW)
#1	122.5
#2	125
#3	125
Total	372.5

C. CURRENT ELECTRICAL CONSUMPTION (DEMAND)

The Ungusraq Power Company provides electricity for the entire village with the exception of the old BIA School and the new school which both have their own power generators. The Ungusraq Power Company's records show a maximum, recorded peak load of 100 kW on December 23, 2001. See Appendix D for the daily peak loads in December 2001 at the Ungusraq Power Company's plant. This is approximately 10 kW higher than any previous peak loads on record. The new school reported that their maximum load occurs around noon each day and is about 55 kW. The old BIA school reportedly has a maximum demand of approximately 35 kW. The maximum, (peak) electrical demand in 2001 was approximately 190 kW.

III. PROPOSED NEW FACILITY

A. SITE SELECTION

The site selected is next to the existing power plant and adjacent to the water tank and washeteria/water treatment facility. This site was selected for several reasons: lack of historical use by others; the community's request for this site; its close proximity to the washeteria/water treatment facility; and the ease of connecting it to the existing electrical distribution system. The community's primary reason for selecting this site is its close proximity to the washeteria/water treatment facility. The community wants to continue using the waste heat from the generators to help differ the cost of operating their washeteria/water treatment facility. The only problem with this site is the lack of a pipeline linking it with the bulk fuel tanks at the north end of the village. Unfortunately, there are no suitable facilities near the fuel tank farm to benefit from a waste heat recovery system. See Appendix A for site location recommendation by the community.

B. SITE CONTROL

The lands in and around the village of Newtok are held by the Newtok Corporation and have not been subdivided by a U.S. Survey. The site is located on property to which clear ownership has not been determined. Personnel from the Department of Community and Economic Development recommend that the new facility and structures be located on property which does not show any signs of historical use, since sites which have been used in the past may have a legal ownership claim which is not identified at this time. This site will require working with the Newtok Corporation to obtain site control. This site does not appear to be disturbed or have any potential claim for historical use.

C. SOIL CONDITIONS

The soils near the site of the new power plant are frozen silty sand according to a soil report prepared in 1982 by the Public Health Service for the design of the adjacent water tank. A review of aerial photos also indicates the soil at the proposed site is probably underlain with marginally frozen, ice rich soils susceptible to severe settlement if they are not maintained in a frozen state.

A complete geotechnical investigation should be performed prior to the completion of the power plant design to verify the actual site conditions and design assumptions.

D. COMMUNITY FLOOD DATA

The US Army Corps of Engineers – Flood Plain Management Services ALASKAN COMMUNITIES FLOOD HAZARD DATA 2000 publication indicates "no known flooding" for the village of Newtok. However, a report by Woodward/Clyde in February 24, 1984 entitled "Ninglick River Erosion Assessment" commented that the "When the wind blows onshore in the Bering Sea, the tide may riser higher than normal because of storm surge. Newtok experiences flooding from the Newtok River, a small river north of the village, about twice a year as a result of these surges".

E. LOCAL FILL MATERIAL

No suitable local fill material is available.

F. POWER GENERATION BUILDING FOUNDATION

Since the site is considered to have marginally frozen, ice rich soils, the building foundation must maintain the thermal stability of the existing ground to prevent thaw settlement. Further, since no local fill material is available, and the cost for constructing a thaw stable gravel fill pad with imported gravel would be extremely expensive and difficult, a pile-supported building is recommended. The building is to be supported on

ad-freeze piling installed in the winter during frozen conditions. The piling and platform are to be constructed with steel pile, structural members and plate.

G. POWER GENERATOR BUILDING

The building will be a pre-engineered metal and wood structure 30 feet by 48 feet. It will be insulated and provide interior partitions to close off work areas from the generator noise. The floor and wall main structural members will be steel. The building will house the generators and all associated switchgear.

H. FUEL SYSTEM

The Ungusraq Power Company has three bulk fuel tanks with a combined capacity of 40,000 gallons located at the extreme north end of the village. Since there is not a pipeline linking the bulk fuel tank farm with the new power plant site, a pipeline needs to be constructed or the fuel hauled overland or along the boardwalk. The community has stated that they would prefer hauling the fuel rather than using a pipeline. They are concerned with a pipeline interfering with their snow machine use. Given the fact that the community does not want a pipeline and the knowledge that the village may move someday, it seems needless to add the expense of constructing 1000 feet of pipeline at this time.

I. PROJECTED ELECTRICAL CONSUMPTION (DEMAND)

The current maximum (peak) load for the community including the old BIA school and the new school is approximately 190 kW. The village expects AVCP to construct approximately 2 homes each year for the foreseeable future. Assuming each home adds 1.5 kW of demand, this would result in an increase of 30 kW over a ten years period. Village Safe Water has very preliminary plans to upgrade the washeteria but no additional electrical loads have been calculated. Village Safe Water said there are also discussions of providing a village wide sewer collection system someday, but again this is so preliminary that future electrical loads are very difficult to estimate. Without well-defined future projects and their associated electrical demands, applying a reasonable annual growth rate for electrical demand to the current demand is the best method of calculating future demand. Assuming an annualized growth rate of 4.7 % for electrical consumption over a ten years period, the peak demand in ten years would be about 300 kW. The 4.7% annual growth rate was determined based on electrical consumption PCE records for the previous five years (1997 – 2001), see Appendix D.

The following using entities for the village were polled for future construction and potential additional loads on the power plant and the results shown here:

1. State of Alaska Dept. of Trans. (Airport) – No foreseeable projects.
2. Southwest Region School District – No foreseeable projects.

3. State of Alaska, Village Safe Water – Several projects in the preliminary planning phase.
4. AVCP Housing – Expect to build approximately 2 new homes per year for the foreseeable future.

Appendix D provides the peak load data as recorded for the years 1997 through 2001. Research produced data for monthly peak loads, power and fuel consumption for the existing plant over the last six years. The peak loads were tracked and charted. The trend from this data provides a baseline load to add the above projects.

A trend analysis was performed on the existing data and showed a gradual linear increase of approximately 4.7% per year. The trend from this data provides a baseline load to add the above projects.

The difference between the absolute annual peak and the trend and that point each year shows an average peak load at 119% of the trend. Projecting these numbers over the ten-year life span of the plant gives approximately a 113 kW trend peak with a 143 kW absolute peak at the end of FY11. Additional monitoring is needed to accurately assess loads for generator sizing. See Appendix D, Peak Load Data.

J. GENERATORS AND SWITCHGEAR

The proposed capacity will be 530 kW, using four generators. This is a 42% increase from existing capacity indicated by the projected growth of the village and the addition of the school facilities to the town load. The generators will feed new load sensing switchgear and step up transformers. The generators are sized so the largest generator can handle the peak loading during the winter. Additional load monitoring is required to properly size the generators as PCE data is used for preliminary purposes only.

K. CONNECTION TO EXISTING ELECTRICAL DISTRIBUTION SYSTEM

The power plant will connect to the existing overhead electrical distribution lines. The new power plant is to be constructed next to the existing plant which will simplify connecting to the existing electrical distribution system.

Since the existing system is in fairly good condition, no upgrades to the system are recommended at this time. The power poles and assemblies are in good condition.

L. OWNERSHIP AND OPERATION

The proposed power generation facility and electrical distribution system are owned and operated by Ungusraq Power Company. UPC also has a bulk fuel tank farm that they also own and operate.

M. PERMITTING

The construction and operation of the new power plant requires the following permitting:

1. Coastal Project Questionnaire

Projects located in a coastal region must submit a Coastal Project Questionnaire under the Alaska Coastal Management Program to the State of Alaska, Department of Governmental Coordination (DGC). The DGC reviews the questionnaire and assists in identifying required permits pertinent to the project. The standard review spans a 30 day period, subsequent to the Corps of Engineers issuance of the DA Permit. Projects outside of coastal zones are excluded from this process.

2. Fire Marshal Review

The construction of the new power generation facility will require submittal of a complete set of construction documents to the State of Alaska, Department of Public Safety, Division of Fire Prevention (Fire Marshal) for plan review and approval. The State Fire Marshall then issues a Plan Review Permit to verify compliance with approved Building, Fire, and Life Safety codes. Final stamped drawings must be submitted along with the application fee for project review. Anticipate a minimum of one month before comments may be received from the Fire Marshall.

3. US Army Wetlands Permit

Power plant projects that place fill material on existing soil require an Application for Department of the Army Permit to be submitted to the United States Army Corps of Engineers, Alaska District before construction begins. The Corps of Engineers will review this project under an 18 day public notice Nationwide Permit. Projects constructed on piling without placing fill are not subject to the jurisdiction of the Corps of Engineers.

4. FAA Review

Power plants located less than 5 miles from a runway or airport should complete Form 7460-1, "Notice of Proposed Construction or Alteration", and submit all necessary elevation and height of structure information to the Federal Aviation Administration, Alaska Region (FAA) prior to construction. The FAA reviews the power plant and determines whether the construction or project will present a hazard to air traffic in the vicinity. Projects located beyond the 5 mile range should be reviewed on a case be case basis as to whether Form 7460-1 should be

submitted. The FAA has typically provided project determinations within one week of the completed form submittal.

5. ADEC Review

The Alaska Department of Environmental Conservation (ADEC) regulates the operation of diesel power generation facilities by a consistency review process. The Application for Pre-Approved Limit Diesel Generation Facility must be submitted prior to the facility startup provided that the nitrogen oxide emissions, do not exceed 100 tons/year. The review is setup to accommodate future growth of a power plant, provided that growth is requested during the initial application and it does not exceed the 100 ton/year of nitrogen oxide emissions.

6. RCA Certification

The Regulatory Commission of Alaska regulates public utilities by certifying qualified providers of public utility and pipeline services; and ensuring that they provide safe and adequate services and facilities at just and reasonable rates, terms, and conditions. This keeps rates as low as possible while allowing the utility to earn a fair return. The commission also determines the eligibility and the per kilowatt-hour support for electric utilities under the Power Cost Equalization program.

N. CONSTRUCTION METHOD

Construction of the new power plant is to be conducted using Force Account methods. Under qualified management, this construction method has traditionally produced cost effective results, fast construction schedules and increased local hire.

When working on a Force Account basis, the project typically hires a qualified superintendent and local labor where available. Additional personnel may need to be brought in to supplement the local labor force for specialty trades, such as pipe welding and electrical installation.

Traditionally, Force Account projects have enlisted the use of local equipment where available. Where the local equipment use cannot be donated to the project, equipment rental rates are negotiated or traded off for equipment repair.

1. Local labor

The Newtok Community was questioned about the local available labor force. They indicated that no formal list was available which identified personnel and skills.

2. Local Equipment

No equipment, other than for airport maintenance, is available in the community. All equipment for this project will have to be shipped in.

O. SCHEDULE

A construction schedule has been prepared based on historical force account construction methods and crew sizes. Due to the ground conditions, most of the construction must occur while the ground is frozen. For this reason, the schedule identifies material delivery and equipment delivery to the village in the fall with construction started in the winter. All heavy equipment use must be completed and the equipment must be staged for demobilizing from the village prior to the spring thaw.

Note: The proposed schedule is very dependent upon many inter-related factors, such as project start time, material availability and weather. If any of these items creates a delay, the project may run into the following season, which will increase the construction costs. In order to address this potential delay, and increased cost, and a 20% construction contingency should be used in cost estimating for the project.

P. BUDGET COST ESTIMATE

A Budget Cost Estimate has been prepared for construction of the power generation facility as presented on the Conceptual Project Layout Plan, (see Appendix F for the complete detailed estimates). The estimate was developed based on historical Force Account construction costs for recent power plant projects in southwest Alaska. Equipment rental rates are based on historical rental rates for similar equipment. This estimate includes design cost, construction costs, regulatory plan development costs, project management costs and a construction contingency of 20%. The total Budget Cost Estimate is approximately $1,538,040.

APPENDIX A

SITE RECOMMENDATION FROM THE VILLAGE

NEWTOK TRADITIONAL COUNCIL
P.O. BOX 5545 NEWTOK, ALASKA 99559 PHONE (907) 237-2314 FAX (907) 237-2428

January 29, 2002

Derrick Howard
LCMF
Anchorage, AK

Subject: Generator Location

Dear Mr. Howard;

I'm replying about our Grant money available through Denali Commission of amount of $450,000.00.

The Newtok Traditional Council had a Special Joint meeting with the Ungusraq Power Company along with the Elders on January 25th, 2002.

The members wanted the Power Company build near the exciting site, because the Power Company is out dated, Power lines, transformers, bulk fuel tanks and the Power Panel's. They want the site next to the old generator building, so we can use the Waste heat to the PHS building.

The Members don't want a pipeline to the new site, but use the container cap city of about 100 to 300 gallon transfer fuel with the electric pump amount to the container.

The village had a Public Meeting on January 28, 2002 and the village members wanted the new power plant build on the present site.

NEWTOK TRADITIONAL COUNCIL
P.O. BOX 5545 NEWTOK, ALASKA 99559 PHONE (907) 237-2314 FAX (907) 237-2428

5 YEAR PLAN

Newtok Traditional Council is planning to build housing at the present location, because of the old age houses.

We're building two (2) housing every year with the BIA HIP & AVCP Village Allocation. AVCP Housing Authority is building three (3) more under their programs.

The Council member's are still trying to build a larger Clinic; the existing building is over crowded. Also the Army is building a new Army for the National Guard, it will be larger then the old Army building.

The LKSD teacher housing are connected to the village power, they want to plug to their school, but the generator cannot hold the school, the old BIA is running their own power, LKSD will not rerun the old BIA generator, once it stop running the will not re-operate the old BIA School, LKSD will hand over to BIA building TO THE Newtok Traditional Council.

Newtok will use the BIA building to the multi office building consists of Tribal Operation, Tribal Court, Police Station, Education Care, Johnson O'Malley Program, BIA Home Improvement Program, PHS office, drug & Alcohol Program and many more.

If you have any questions, please feel free to call the Power Company Operators or me. There number is (907) 237-2177.

Thank you,

Stanley Tom, Tribal Administrator Assistant

APPENDIX B

GEOTECHNICAL INFORMATION

UNITED STATES GOVERNMENT

memorandum

DATE: July 26, 1982

REPLY TO ATTN OF: COSTEP
Alaska Area Native Health Service

Refer to: A-EHB

SUBJECT: Newtok Village Subsurface Exploration Report

TO: FOR THE RECORD

OBJECTIVE:

The Newtok subsurface exploration was completed on July 1, 1982, with the purpose of determining the subsurface conditions at the proposed site of the water tank. The exploration was performed by Mr. LeRoy DiPasquale, Mr. Barry Kellems, and Mr. David Schoellhamer.

FINDINGS AND ACCOMPLISHMENTS:

A 23 foot hole was punched down using a 140 pound hammer with a three inch split spoon to nine feet and a two inch split spoon thereafter. The temperature at nine feet immediately after removing the three inch spoon was 31.3°F using the Doric meter. Samples were taken throughout the length of the hole. Temperature readings taken after drilling was completed showed 31.9°F at five feet gradually decreasing to 31.3°F at the bottom of the hole. Thermistors were then installed. The boring log shows gray silts interbedded with ice lenses to a depth of about 20 feet followed by silty sand with no visible ice, low moisture content, and low salinity. In addition, the Doric meter was used to take temperature readings from thermistors at the high school with the results shown below:

Depth (feet)	#1	#2
5	29.6°F	29.5°F
10	29.5°F	29.7°F
15	29.8°F	30.1°F

RECOMMENDATIONS AND/OR CONCLUSIONS:

The log is in agreement with previous logs found for the high school and thus is considered representative. The silty sand extends downward below depths of concern and will be the major source of support for the piles.

David Schoellhamer

David Schoellhamer

jh

Attachments

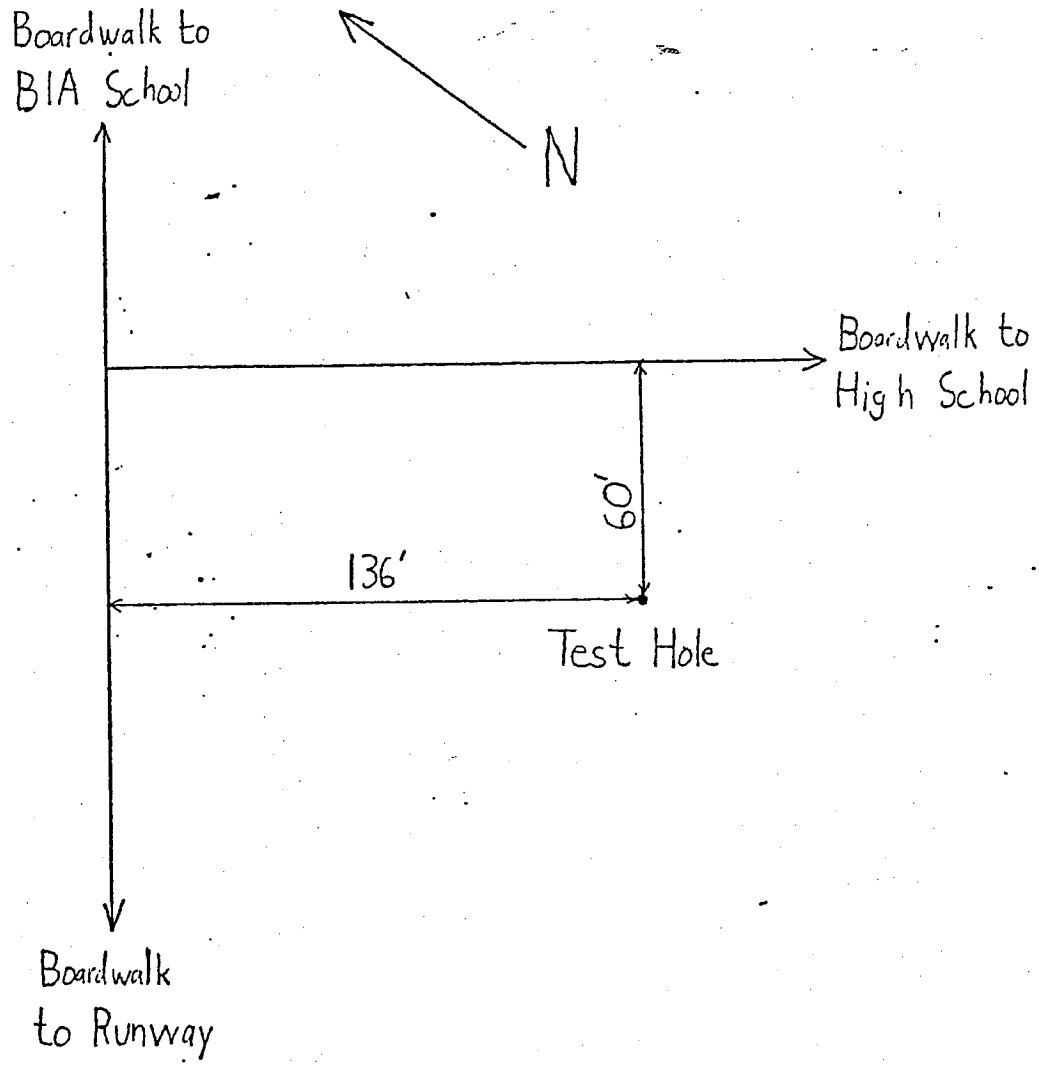
cc: LeRoy DiPasquale
Reid Bond
Doug Marx
Dan Carpenter
Barry Kellems

APPENDIX

Newtok High School Well Log

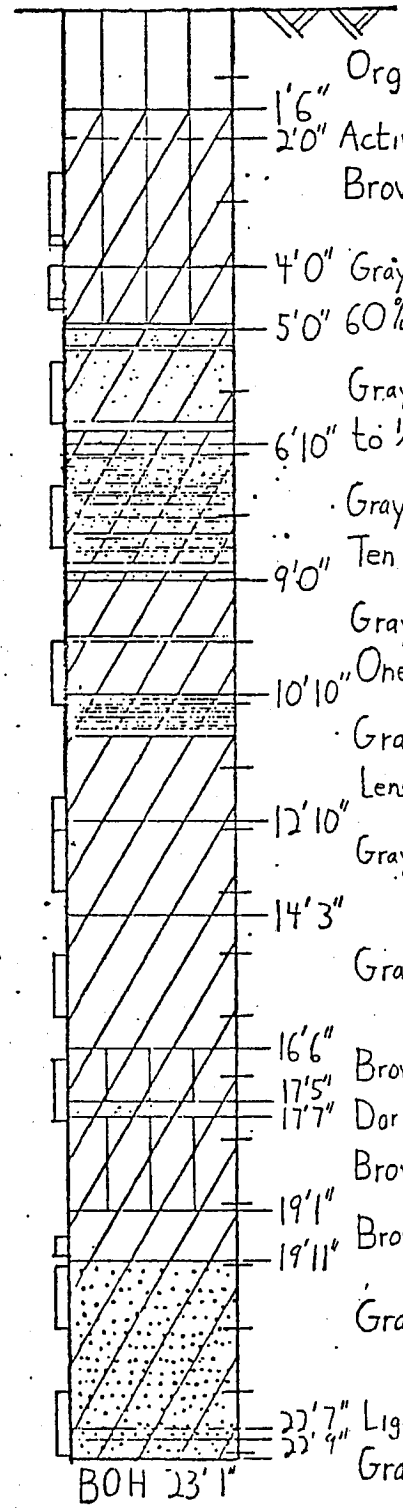
Depth (feet)	Description
0-39	Brown dirt, frozen muck
39-258	Silty sand, gray frozen
258-263	Silty sand, water
263	Gray clay

NEWTOK
Test Hole Location



NEWTOK TEST HOLE

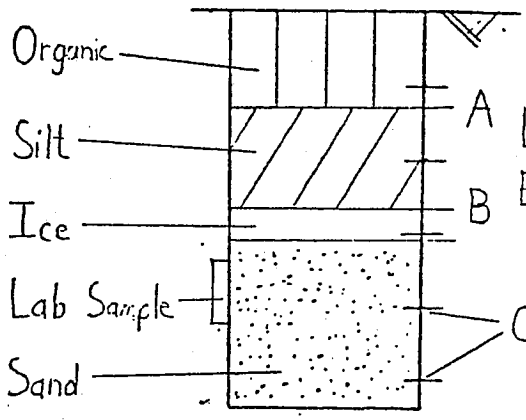
Organic Content	Salinity (ppm)	Moisture Content
		108%
6.69%		96%
		41%
	61	111%
		48%
		153%
		42%
		46%
2.30%	12	79%
		44%
		77%
9.07%	18	
		43%
1.24%	13	8%
		13%



1'6" Organic Material.
2'0" Active Layer Ends. Brown Silt w/Organics, 50% V_x
4'0" Grayish-Brown Silt w/Some Organics.
5'0" 60% Ice lenses to 1/8", One 1" Lense.
Gray Fine Sandy Silt, 60% Ice Lenses
6'10" to 1/8", One 1" Lense, One 1 1/2" Lense.
Gray Fine Sandy Silt, 80% Ice,
9'0" Ten Lenses 1" to 2 1/2" Thick.
Gray Silt, 40 to 50% V_s
10'10" One 1" Lense
Gray Silt, 50 to 60% Thin Ice Lenses, Five 1" Lenses
12'10" Gray Silt, 50% V_s
14'3" Gray Silt, 30% V_s
16'6" Brown Silt w/Some Organics, 40% V_s
17'5" 17'7" Dark Gray Fine Sandy Silt, Nbn
Brown Silt w/Some Organics, 50% V_s
19'1" Brown Silt, V_x
19'11" Gray Silty Fine Sand, Nbn
22'7" 23'9" Light Brown Silty Fine Sand, Nbn
Gray Silty Fine Sand, Nbn
BOH 23'1"

TEST HOLE LEGEND

Drilling Completed 7/1/82 Not To Scale



Nbn - Ice Not Visible, Soil Well Bonded, No Excess Ice

V_s - Visible Ice in Lenses Less Than 1" Thick

V_x - Visible Ice Less Than 1" Thick in Individual Crystals

WATER CONTENT DETERMINATION

Data Sheet 1

Project Newtok Job No. _____

Location of Project Water tank site

Description of Soil _____

Tested By Dipasquale, Kellems Date of Testing 7-8-87

Date of Weighing _____

Boring no.	1	1 Jar	1	1 Jar	1
Container no. (cup) depth	1 2'6"-3'6"	2 3'6"	3 4'0"-4'6"	4 4'6"	5 5'6"-6'6"
Wt. of cup + wet soil (grams)	125.3	118.6	151.0	83.2	154.4
Wt. of cup + dry soil	71.3	70.9	113.5	50.8	111.7
Wt. of cup	21.2	21.3	21.5	21.6	22.6
~~Wt. of dry soil~~ Volume Change	—	—	—	—	—
Wt. of water					
Water content, w%	105%	96%	41%	111%	45%

Boring no.	1	1	1	1	1
Container no. (cup) depth	6 7'6"-8'6"	7 10'0"-11'0"	8 12'6"-13'0"	9 13'0"-14'0"	10 15'0"-16'0"
Wt. of cup + wet soil (grams)	113.2	152.8	151.5	139.8	158.6
Wt. of cup + dry soil	58.4	113.5	109.9	87.2	116.4
Wt. of cup	22.6	20.8	20.3	21.0	21.0
~~Wt. of dry soil~~ Volume Change	—	—	+	—	—
Wt. of water					
Water content, w%	153%	42%	46%	79%	44%

#3 Sample hard

#4 Vol. = 7/11 of cup, sample hard.

#7 Sample hard.

WATER CONTENT DETERMINATION

Data Sheet 1

Project Newtok Job No.

Location of Project water tank site

Description of Soil

Tested By Dipasquale, Kellogg Date of Testing 7-8-82

Date of Weighing

Boring no.	1	1	1	1	
Container no. (cup) slopin	11 16'8"-17'8"	12 19'6"-19'11"	13 20'6"-21'6"	14 22'6"-23'6"	
Wt. of cup + wet soil grams	146.5	94.8	117.7	137.3	
Wt. of cup + dry soil	91.9	72.7	110.8	123.8	
Wt. of cup	20.8	20.9	20.8	22.7	
~~Wt. of dry soil~~ Volume Change	—	—	0	0	
Wt. of water					
Water content, w%	77%	43%	8%	13%	

Boring no.					
Container no. (cup)					
Wt. of cup + wet soil					
Wt. of cup + dry soil					
Wt. of cup					
Wt. of dry soil					
Wt. of water					
Water content, w%					

GRAIN SIZE ANALYSIS-MECHANICAL

Data Sheet 6

Project Newstok Job No. _____

Location of Project Water Tank Boring No. 1 Sample No. 5,6

Description of Soil _____ Depth of Sample 5'6" - 8'6"

Tested By B. Kellems Date of testing 7-8-82

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum Wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample + container	
Wt. of container	
Wt. of dry sample, W_1	

Sieve analysis and grain shape

Sieve no.		~~Wt Diam. (mm)~~ (g) sieve and soil	Wt. retained	% retained	% passing
20	349.6	398.6	—	0	100 %
40	388.3	395.7	7.4	7 %	93
60	370.8	385.2	14.4	14 %	79 %
70	340.9	348.2	7.3	7 %	72 %
100	325.5	333.0	7.5	7 %	65 %
200	343.6	351.4	7.8	7 %	58 %
Pan	370.1	430.9	60.8	58 %	
			105.2		

% passing = 100 − ∑ % retained.

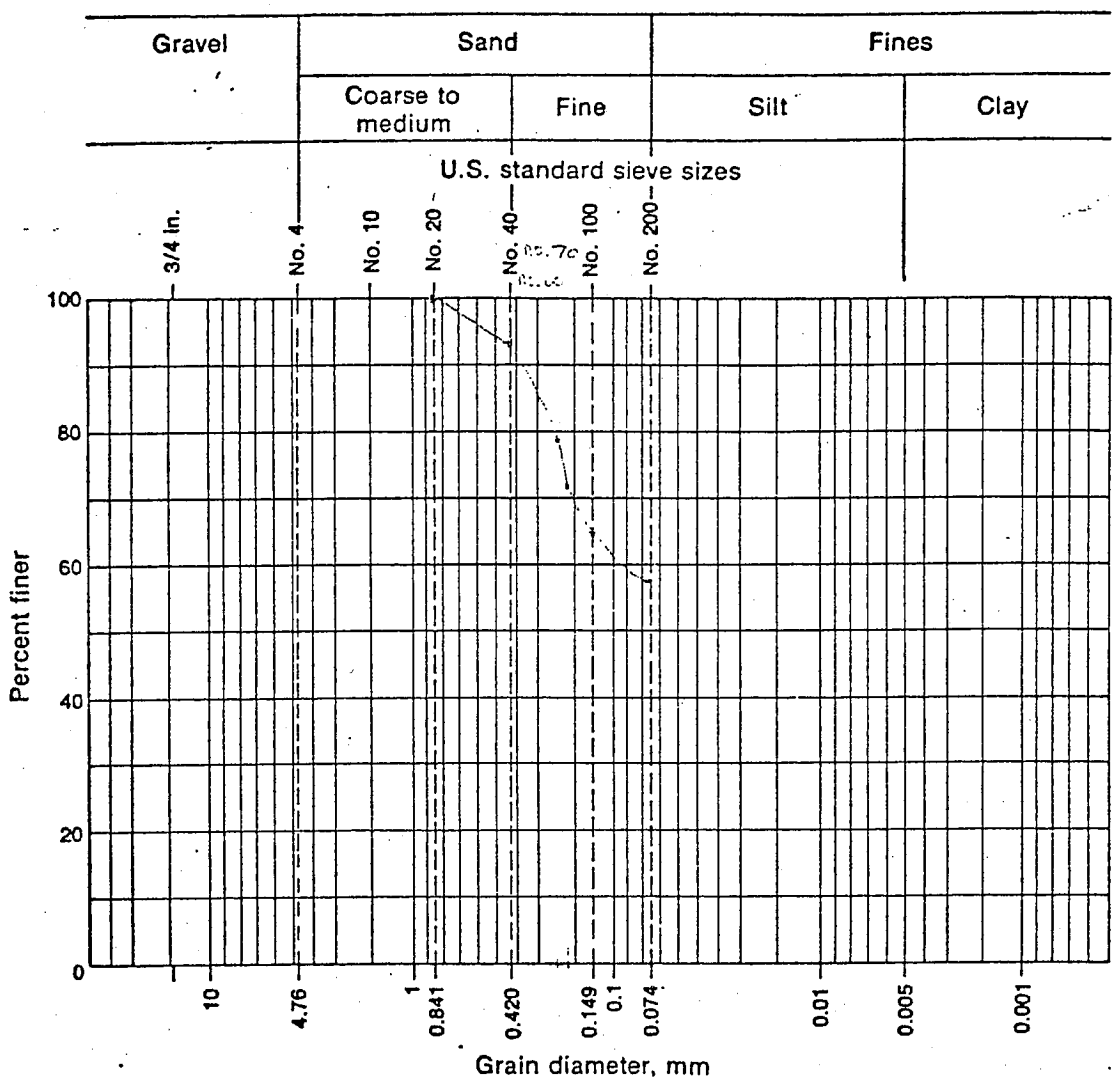
GRAIN SIZE DISTRIBUTION Data Sheet 5

Project New tank Job. No. _____

Location of Project Water Tank Boring No. 1 Sample No: 5, 6

Description of Soil _____ Depth of Sample 5'6" - 8'6"

Tested By. B. Kollmans Date of Testing 7-8-82



Visual soil description _____

_____

Soil classification:

_____ System _____

GRAIN SIZE ANALYSIS-MECHANICAL

Data Sheet 6

Project Newtek Job No. _____

Location of Project Water Tank Boring No. 1 Sample No. 7,8

Description of Soil _____ Depth of Sample 10'0" – 13'0"

Tested By B. Kellems Date of testing 7-8-82

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum Wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample + container	
Wt. of container	
Wt. of dry sample, W,	

Sieve analysis and grain shape

Sieve no.	~~Diam. (mm)~~		Wt. retained	% retained	% passing
20	345.6	345.6	—	0	100%
40	338.3	341.1	2.8	2%	98%
60	370.8	375.7	4.9	3%	95%
70	340.9	342.2	1.3	1%	94%
100	325.5	327.7	2.2	1%	93%
200	343.6	349.5	5.9	4%	89%
Pan	370.1	510.4	140.3	89%	
			157.4		

% passing = 100 – Σ % retained.

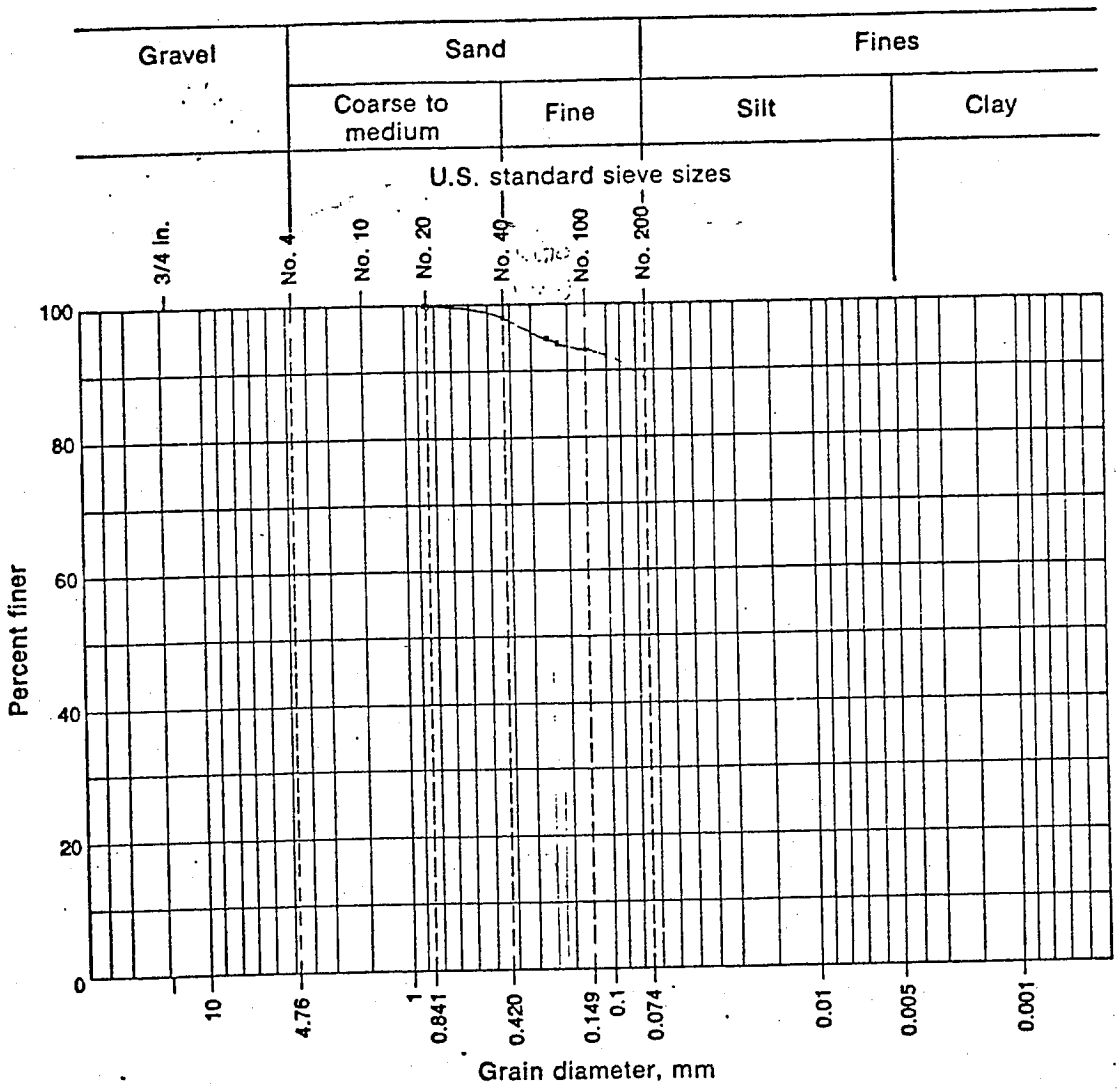
GRAIN SIZE DISTRIBUTION Data Sheet 5

Project Newtok Job. No. _____

Location of Project Water Tank Boring No. 1 Sample No: 7,8

Description of Soil _____ Depth of Sample 10'0" – 13'0"

Tested By. B. Kollons Date of Testing 7-8-52



Visual soil description _____

Soil classification:

_____ System _____

GRAIN SIZE ANALYSIS-MECHANICAL

Data Sheet 6

Project Newtok Job No. _____

Location of Project Water tank Boring No. 1 Sample No. 9,10

Description of Soil _____ Depth of Sample 13'0" – 16'0".

Tested By B. Kellems Date of testing 7-8-82

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum Wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample + container	
Wt. of container	
Wt. of dry sample, W_s	

Sieve analysis and grain shape

Sieve no. (Clr)	~~Diam. (mm)~~ (gr)	Wt. retained	% retained	% passing
20	348.6	—	.4	99.6
40	349.9	1.6	.4	99.2
60	370.8 371.8	1.0	.6%	98.4%
70	340.9 341.3	0.4	.3%	98.1%
100	325.5 326.4	0.9	.6%	97.5%
200	343.6 350.6	7.0	4.5%	93%
Pan	370.1 513.8	143.7	93.0%	
		154.6		

% passing = 100 – $\sum$ % retained.

GRAIN SIZE DISTRIBUTION

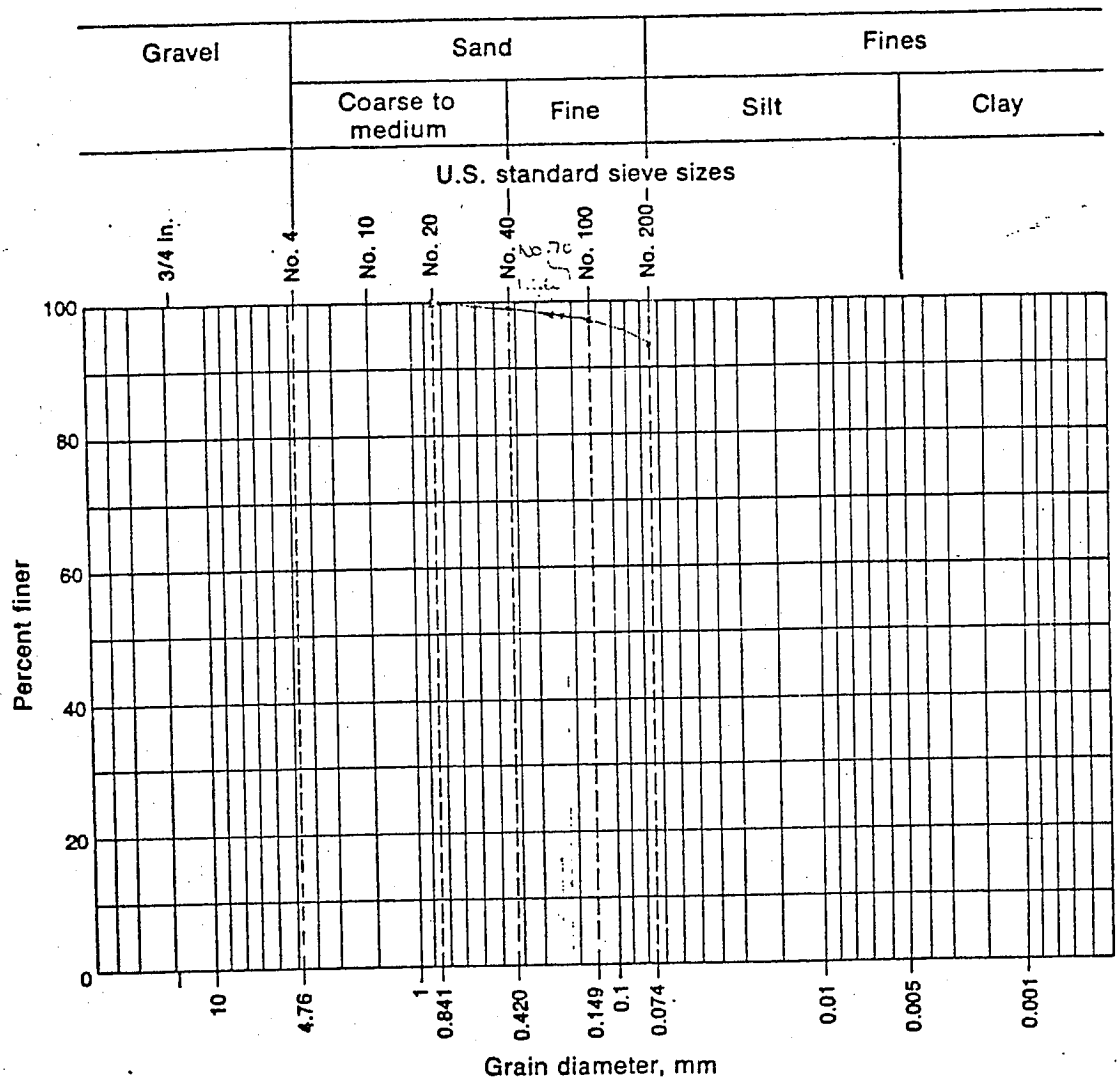
Data Sheet 5

Project Newtok Job. No. _____

Location of Project Water Tank Boring No. 1 Sample No. 9,10

Description of Soil _____ Depth of Sample 13'0" - 16'0"

Tested By. B. Kellums Date of Testing 7-5-12



Visual soil description _____

Soil classification:

_____ System _____

GRAIN SIZE ANALYSIS -MECHANICAL

Data Sheet 6

Project Kuntok Job No. _____

Location of Project Water Tank Boring No. 1 Sample No. 11, 12

Description of Soil _____ Depth of Sample 16'8" - 19' 10".

Tested By B. Kellams Date of testing 7-8-82

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum Wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample + container	
Wt. of container	
Wt. of dry sample, W_1	

Sieve analysis and grain shape

Sieve no.		~~Diam. (mm)~~	Wt. retained	% retained	% passing
20	394.6	[illegible]	—	0	[illegible]
40	385.3	341.X	3.5	2.4 %	[illegible]
60	370.8	375.0	4.2	3.5 %	93.6 %
70	340.9	343.5	2.6	2.2 %	91.4 %
100	325.5	329.4	3.9	3.3 %	88.1 %
200	343.6	358.5	14.9	12.4 %	75.7 %
Pan	370.1	461.07	90.6	75.7 %	
			119.7		

% passing = 100 − ∑ % retained.

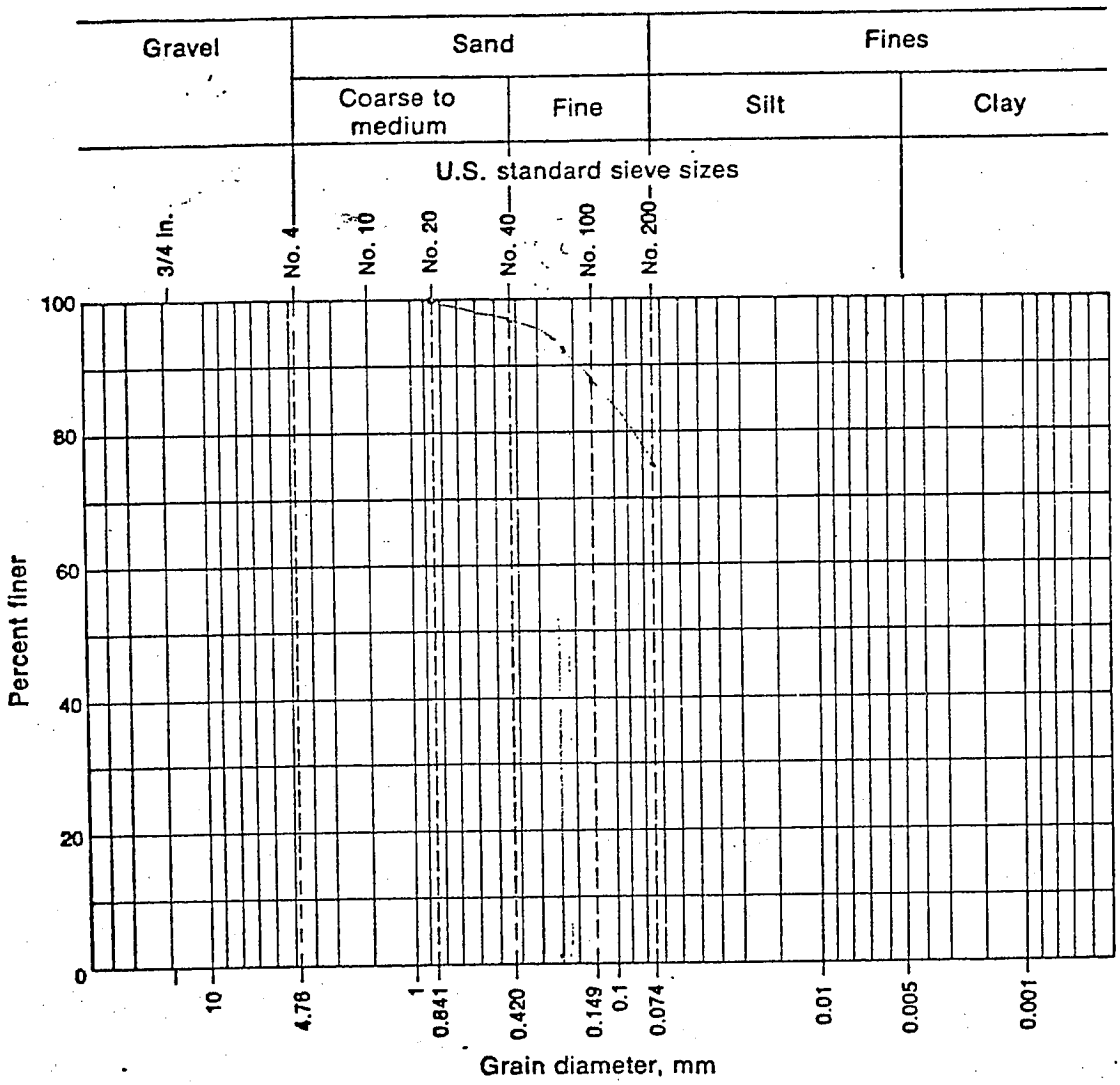
GRAIN SIZE DISTRIBUTION Data Sheet 5

Project Newtok Job. No. _____

Location of Project Water Tank Boring No. 1 Sample No: 11, 12

Description of Soil _____ Depth of Sample 16'8" - 19'10"

Tested By. B. Kellems Date of Testing 7-8-12



Visual soil description _____

Soil classification:

_____ System _____

GRAIN SIZE ANALYSIS-MECHANICAL

Data Sheet 6

Project Newtok Job No. _____

Location of Project Water Tank Boring No. 1 Sample No. 13, 14

Description of Soil _____ Depth of Sample 20'0" – 23'0".

Tested By B. Kellems Date of testing 7-8-82

Soil Sample Size (ASTM D1140-54)

Nominal diameter of largest particle	Approximate minimum Wt. of sample, g
No. 10 sieve	200
No. 4 sieve	500
3/4 in.	1500

Wt. of dry sample + container	
Wt. of container	
Wt. of dry sample, W_s	

Sieve analysis and grain shape

Sieve no.	~~Diam. (mm)~~	Wt. retained	% retained	% passing
[illegible]	[illegible]	—	[illegible]	[illegible]
[illegible]	[illegible]	—		
60	370.8	373.0	2.2	1.2%	98.8%
70	340.9	343.8	2.9	1.5%	47.3%
100	325.5	344.5	19.0	10.7%	87.3%
200	343.6	423.7	80.1	42.2%	45.1%
Pan	370.1	455.7	85.6	45.1%	
			169.8		

% passing = 100 – $\sum$ % retained.

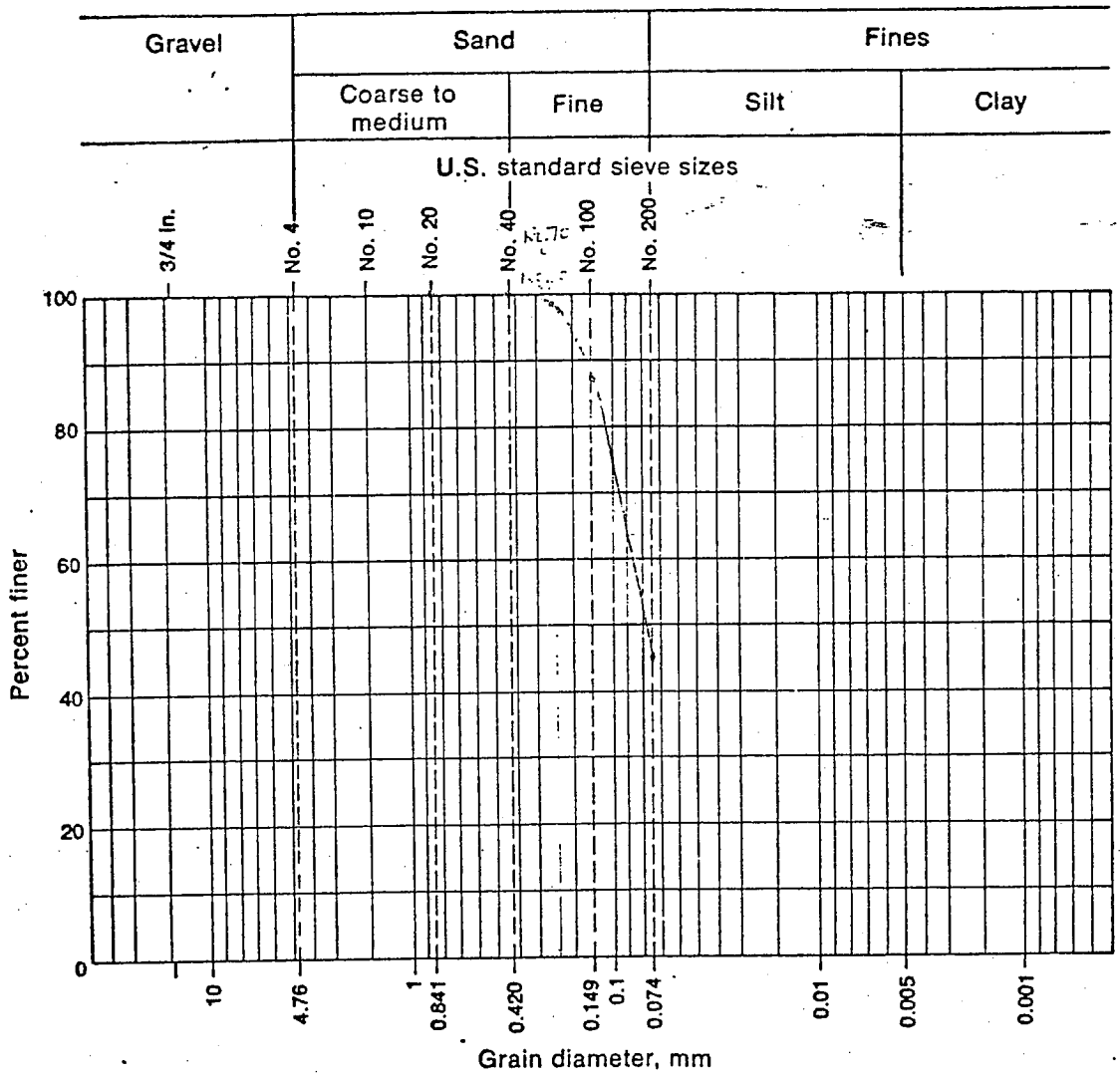
GRAIN SIZE DISTRIBUTION Data Sheet 5

Project Newton Job. No. _____

Location of Project Water Tank Boring No. 1 Sample No. 12 14

Description of Soil _____ Depth of Sample 20'0" - 25'0"

Tested By. J. Williams Date of Testing 7-9-12



Visual soil description _____

_____

Soil classification:

_____ System _____

ATTERBERG LIMITS DETERMINATION

Data Sheet 3

Project Nelutak Job No. _____

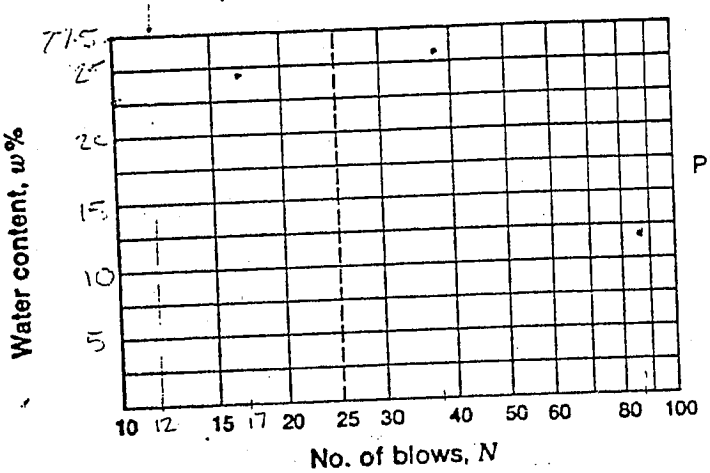
Location of Project Water Tank Boring No. 1 Sample No. 7,8,9,10

Description of Soil _____

Depth of Sample 10'0" - 16'0" Tested By DiRosario, Kellems Date 2-4-82

Liquid Limit Determination

Can no.	1	2	3	4	5	
Wt. of wet soil + can	21.5	42.1	31.8	27.7	32.5	
Wt. of dry soil + can	21.0	36.5	28.7	25.5	29.2	
Wt. of can	14.6	16.5	16.7	15.8	14.5	
Wt. of dry soil	6.4	20.0	12.0	9.7	14.7	
Wt. of moisture	.8	5.6	3.1	2.2	3.6	
Water content, w%	12.5	28	25.8	22.7	24.5	
No. of blows, N	37	12	35	10	17	



Flow index F_f = _____

Liquid limit = _____

Plastic limit = _____

Plasticity index I_P = _____

Plastic Limit Determination

Can no.				
Wt. of wet soil + can				
Wt. of dry soil + can				
Wt. of can				
Wt. of dry soil				
Wt. of moisture				
Water content, $w\% = w_P$				

APPENDIX C

U.S. ARMY CORPS OF ENGINEERS – FLOOD PLAIN MANAGEMENT SERVICES, ALASKAN COMMUNITIES FLOOD HAZARD DATA JUNE 2000 PUBLICATION INFORMATION

ALASKAN COMMUNITIES FLOOD HAZARD DATA 2000
U.S. Army Corps Of Engineers – Flood Plain Management Services

COMMUNITY: Newtok

COUNCIL OFFICE: (907) 237-2314
STATUS: Unincorporated

POPULATION: 284
BUILDINGS:

RIVER SYSTEM: Kealavik R.
COASTAL AREA: none

NFIP STATUS: Not Participating
FLOOD PLAIN REPORT: No
FLOOD INSURANCE STUDY: No

LAST FLOOD EVENT:
FLOOD CAUSE:
ELEVATION:

FLOOD OF RECORD:
FLOOD CAUSE:
ELEVATION:

WORST FLOOD EVENT:
FLOOD CAUSE:

FLOOD GAUGE: No

COMMENTS:

No known flooding.

APPENDIX D

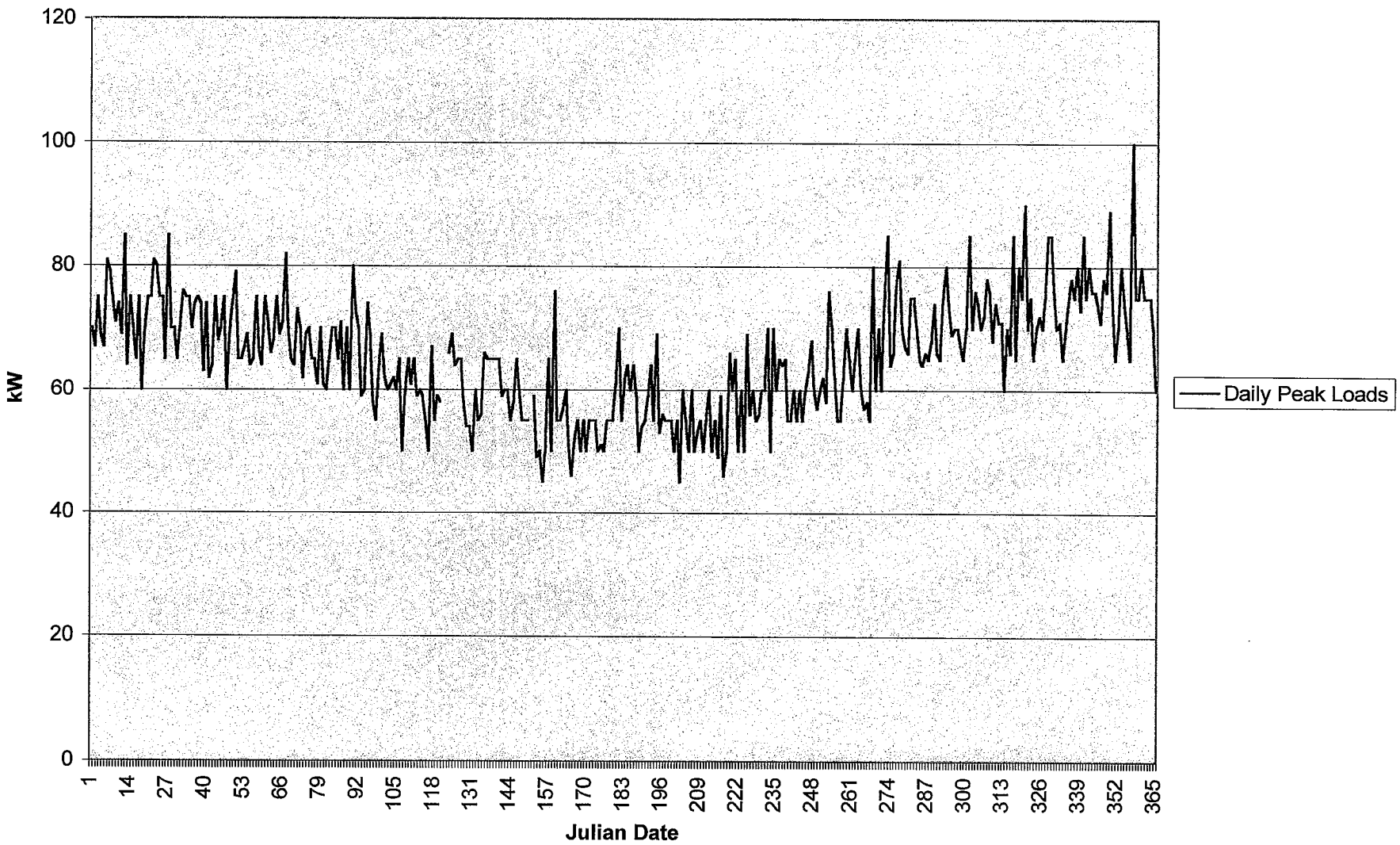
PEAK LOAD DATA

Newtok Power Plant's Daily Peak Loads for 2001

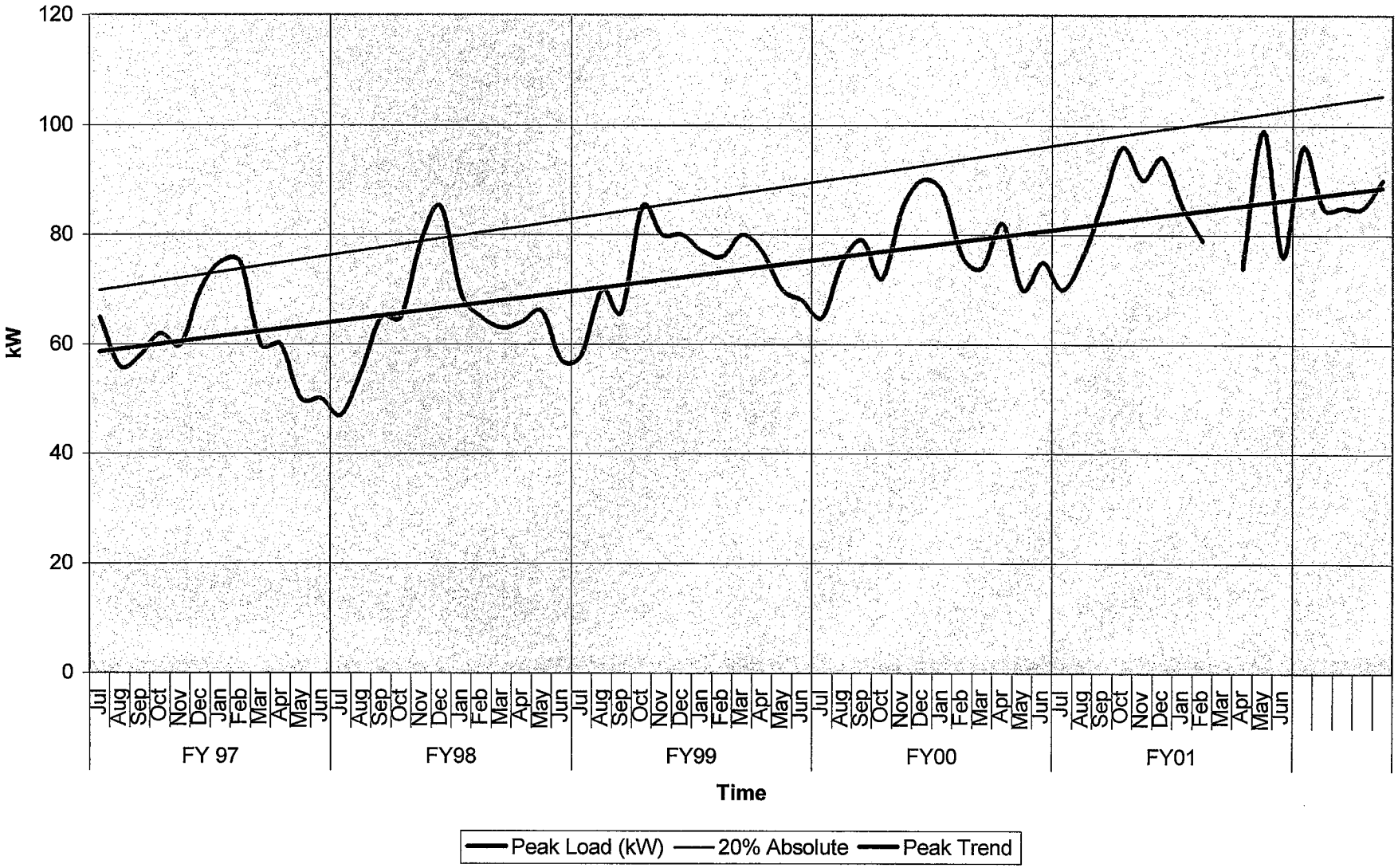
Projec Code 01-424 KW NEWTOK

Jan.		Feb.		March		April		May		June		July		August		Sept.		Oct.		Nov.		Dec.	
DATE	KW	DATE	KW	DATE	KW	DATE	KW	DATE	KW	DATE	KW	DATE	KW	DATE	KW	DATE	KW	DATE	KW	DATE	KW	DATE	KW
1/1	70	2/1	76	3/1	75	4/1	73	5/1		6/1	59	7/1	55	8/1	50	9/1	55	10/1	64	11/1	70	12/1	75
1/2	67	2/2	75	3/2	71	4/2	70	5/2		6/2	49	7/2	62	8/2	55	9/2	60	10/2	66	11/2	72	12/2	78
1/3	75	2/3	75	3/3	66	4/3	59	5/3	66	6/3	50	7/3	64	8/3	49	9/3	63	10/3	77	11/3	78	12/3	75
1/4	69	2/4	70	3/4	68	4/4	60	5/4	69	6/4	45	7/4	60	8/4	59	9/4	68	10/4	81	11/4	76	12/4	80
1/5	67	2/5	74	3/5	75	4/5	74	5/5	64	6/5	50	7/5	64	8/5	46	9/5	60	10/5	70	11/5	68	12/5	73
1/6	81	2/6	75	3/6	69	4/6	69	5/6	65	6/6	65	7/6	59	8/6	50	9/6	57	10/6	67	11/6	74	12/6	85
1/7	79	2/7	74	3/7	71	4/7	58	5/7	65	6/7	50	7/7	50	8/7	66	9/7	60	10/7	66	11/7	71	12/7	75
1/8	75	2/8	63	3/8	82	4/8	55	5/8	58	6/8	76	7/8	54	8/8	60	9/8	62	10/8	75	11/8	71	12/8	80
1/9	71	2/9	74	3/9	70	4/9	64	5/9	54	6/9	55	7/9	55	8/9	65	9/9	58	10/9	75	11/9	60	12/9	76
1/10	74	2/10	62	3/10	65	4/10	69	5/10	54	6/10	55	7/10	59	8/10	50	9/10	76	10/10	70	11/10	70	12/10	76
1/11	69	2/11	64	3/11	64	4/11	62	5/11	50	6/11	57	7/11	64	8/11	60	9/11	70	10/11	65	11/11	66	12/11	74
1/12	85	2/12	75	3/12	73	4/12	60	5/12	60	6/12	60	7/12	55	8/12	50	9/12	62	10/12	64	11/12	85	12/12	71
1/13	64	2/13	68	3/13	70	4/13	61	5/13	55	6/13	50	7/13	69	8/13	69	9/13	55	10/13	66	11/13	65	12/13	78
1/14	75	2/14	70	3/14	62	4/14	62	5/14	56	6/14	46	7/14	53	8/14	56	9/14	55	10/14	65	11/14	80	12/14	76
1/15	70	2/15	75	3/15	69	4/15	60	5/15	66	6/15	52	7/15	56	8/15	60	9/15	62	10/15	68	11/15	75	12/15	89
1/16	65	2/16	60	3/16	70	4/16	65	5/16	65	6/16	55	7/16	55	8/16	55	9/16	70	10/16	74	11/16	90	12/16	75
1/17	75	2/17	70	3/17	65	4/17	50	5/17	65	6/17	50	7/17	55	8/17	56	9/17	65	10/17	66	11/17	70	12/17	65
1/18	60	2/18	75	3/18	65	4/18	60	5/18	65	6/18	55	7/18	55	8/18	60	9/18	60	10/18	65	11/18	75	12/18	70
1/19	70	2/19	79	3/19	61	4/19	65	5/19	65	6/19	50	7/19	50	8/19	60	9/19	65	10/19	75	11/19	65	12/19	80
1/20	75	2/20	65	3/20	70	4/20	61	5/20	65	6/20	55	7/20	55	8/20	70	9/20	70	10/20	80	11/20	70	12/20	75
1/21	75	2/21	65	3/21	61	4/21	65	5/21	59	6/21	55	7/21	45	8/21	50	9/21	60	10/21	74	11/21	72	12/21	70
1/22	81	2/22	67	3/22	60	4/22	59	5/22	60	6/22	55	7/22	60	8/22	70	9/22	57	10/22	69	11/22	70	12/22	65
1/23	80	2/23	69	3/23	65	4/23	60	5/23	60	6/23	50	7/23	55	8/23	60	9/23	58	10/23	70	11/23	75	12/23	100
1/24	75	2/24	64	3/24	70	4/24	59	5/24	55	6/24		7/24	50	8/24	65	9/24	55	10/24	70	11/24	85	12/24	75
1/25	75	2/25	65	3/25	70	4/25	55	5/25	58	6/25	50	7/25	60	8/25	64	9/25	80	10/25	67	11/25	85	12/25	75
1/26	65	2/26	75	3/26	65	4/26	50	5/26	65	6/26	55	7/26	50	8/26	65	9/26	60	10/26	65	11/26	75	12/26	80
1/27	85	2/27	66	3/27	71	4/27	67	5/27	60	6/27	55	7/27	53	8/27	55	9/27	70	10/27	70	11/27	70	12/27	75
1/28	70	2/28	64	3/28	60	4/28	55	5/28	55	6/28	55	7/28	55	8/28	55	9/28	60	10/28	85	11/28	71	12/28	75
1/29	70			3/29	70	4/29	59	5/29	55	6/29	61	7/29	50	8/29	60	9/29	75	10/29	70	11/29	65	12/29	75
1/30	65			3/30	60	4/30	58	5/30	55	6/30	70	7/30	55	8/30	55	9/30	85	10/30	76	11/30	70	12/30	70
1/31	70			3/31	80							7/31	60	8/31	60			10/31	74			12/31	60

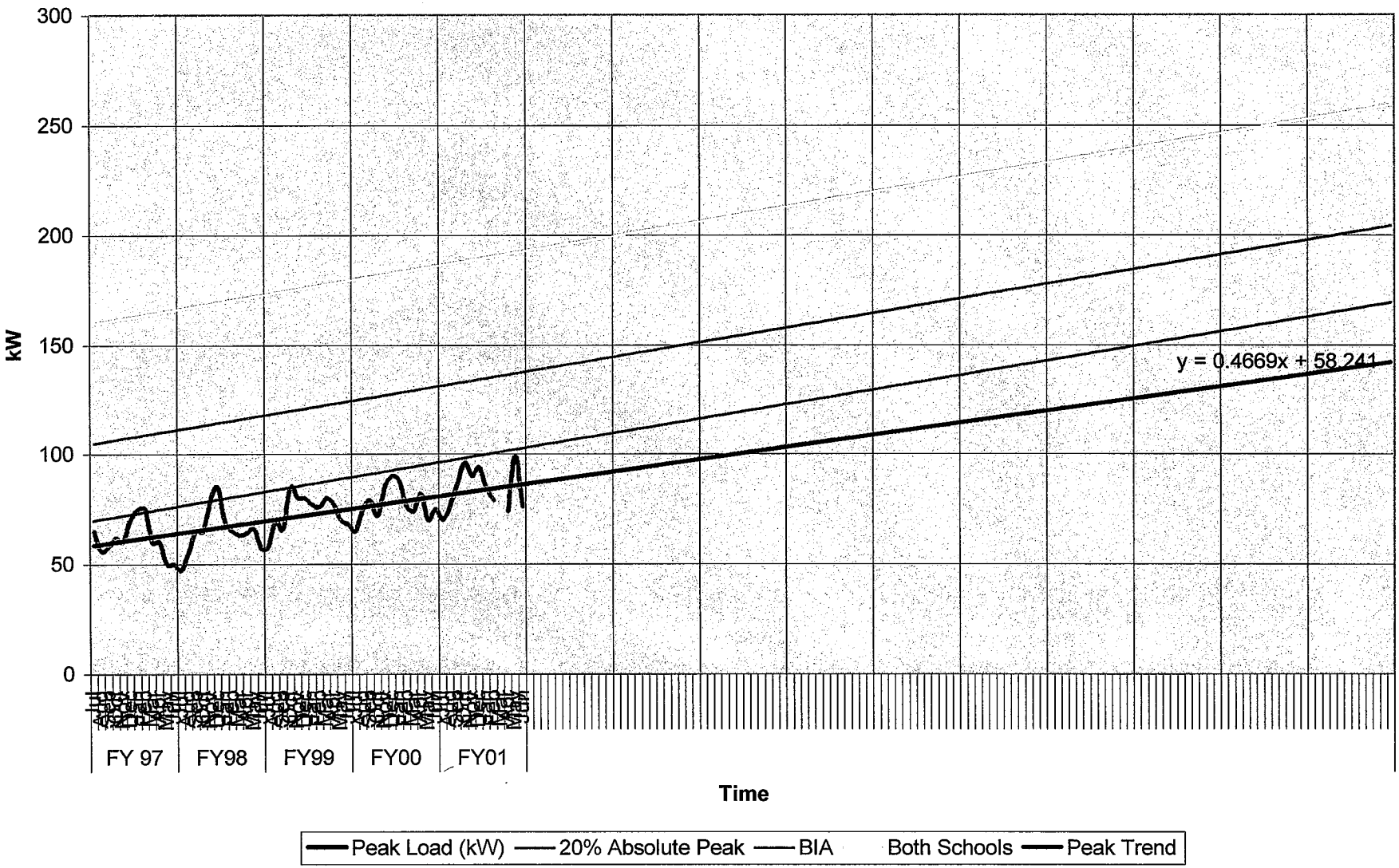
Newtok Power Plant's Peak Loads for 2001



Newtok Peak Load Chart



Newtok Peak Load Chart



Newtok Power Company's Peak Loads

Fiscal Year	Month	Peak Load (kW)	Trend Load	Peak/Trend %
FY 97	Jul	65		
	Aug	56		
	Sep	58		
	Oct	62		
	Nov	60		
	Dec	70		
	Jan	75	62	122%
	Feb	75	62	121%
	Mar	60		
	Apr	60		
	May	50		
	Jun	50		
FY98	Jul	47		
	Aug	55		
	Sep	65		
	Oct	65		
	Nov	79		
	Dec	85	67	128%
	Jan	69		
	Feb	65		
	Mar	63		
	Apr	64		
	May	66		
	Jun	57		
FY99	Jul	58		
	Aug	70		
	Sep	66		
	Oct	85	71	119%
	Nov	80		
	Dec	80		
	Jan	77		
	Feb	76		
	Mar	80		
	Apr	77		
	May	70		
	Jun	68		
FY00	Jul	65		
	Aug	75		
	Sep	79		
	Oct	72		
	Nov	85		
	Dec	90	78	116%
	Jan	88		
	Feb	76		
	Mar	74		
	Apr	82		
	May	70		
	Jun	75		
FY01	Jul	70		
	Aug	76		
	Sep	86		

Newtok Power Company's Peak Loads

	Oct	96		
	Nov	90		
	Dec	94		
	Jan	85		
	Feb	79		
	Mar			
	Apr	74		
	May	99	86	115%
	Jun	76		
FY02	Jul	96	87	111%
	Aug	85		
	Sep	85		
	Oct	85		
	Nov	90		
			Avg Peak %	119%

APPENDIX E

CONCEPTUAL DESIGN DRAWINGS

FIELD BOOK(S):
PLOTTING DATE: 03/07/02 (11:32)
AUTOCAD DRAWING NAME: 424-PLP.DWG

DATE OF PHOTOGRAPHY: 7/04/96

DRAWING NO. C-1

CHECKED BY: DH
DRAWN BY: CR/KK
DATE: 3/7/02
W.O. No: 01-424
REVISION:

State of Alaska
Department of Community and Economic Development
AIDEA/AEA
Rural Energy Group
813 West Northern Lights Blvd.
Anchorage, Alaska 99503

ALASKA ENERGY AUTHORITY

NEWTOK POWER PLANT
NEWTOK, ALASKA

CONCEPTUAL DESIGN
PROJECT LAYOUT PLAN

LCMF Incorporated
A subsidiary of Ukpeaġvik Iñupiat Corporation
Anchorage, Alaska (907) 273-1830
Barrow, Alaska (907) 852-8212

STATE OF ALASKA
49th

DATE OF PHOTOGRAPHY: 7/04/96

STATE OF ALASKA
49th
Wiley W. Wilhelm
No. CE-8604
REGISTERED PROFESSIONAL ENGINEER

LCMF Incorporated
A subsidiary of Ukpeagvik Iñupiat Corporation
Anchorage, Alaska (907) 273-1830
Barrow, Alaska (907) 852-8212

NEWTOK POWER PLANT
NEWTOK, ALASKA

CONCEPTUAL DESIGN SITE PLAN

State of Alaska
Department of Community and Economic Development
AIDEA/AEA
Rural Energy Group
813 West Northern Lights Blvd.
Anchorage, Alaska 99503

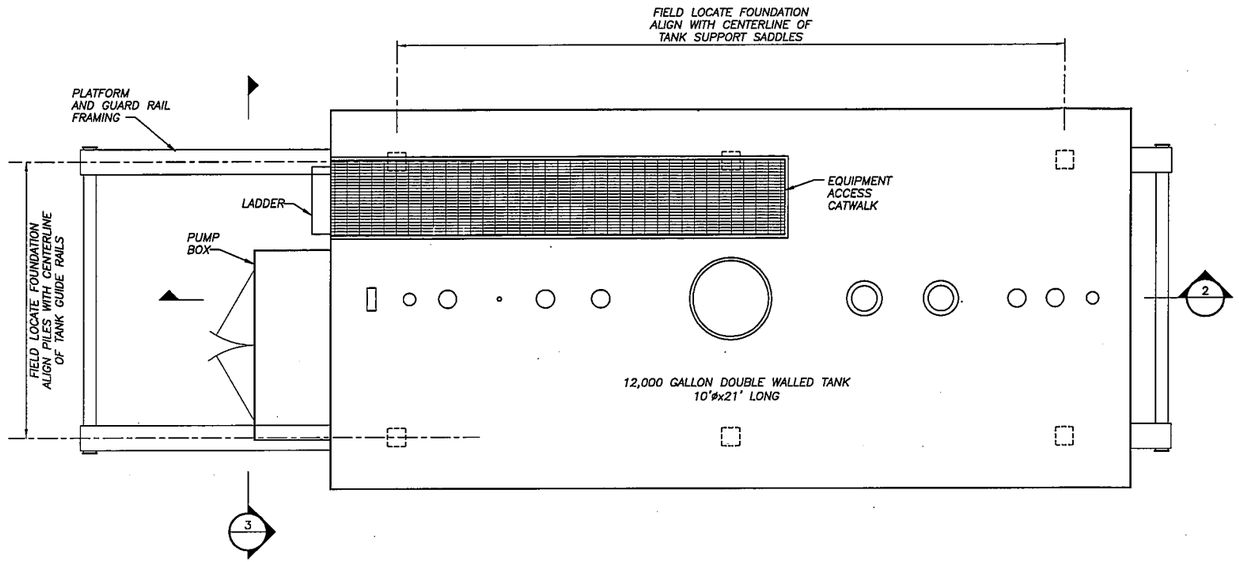
ALASKA ENERGY AUTHORITY

CHECKED BY: DH
DRAWN BY: CR/KK
DATE: 3/7/02
W.O. No: 01-424

REVISION:

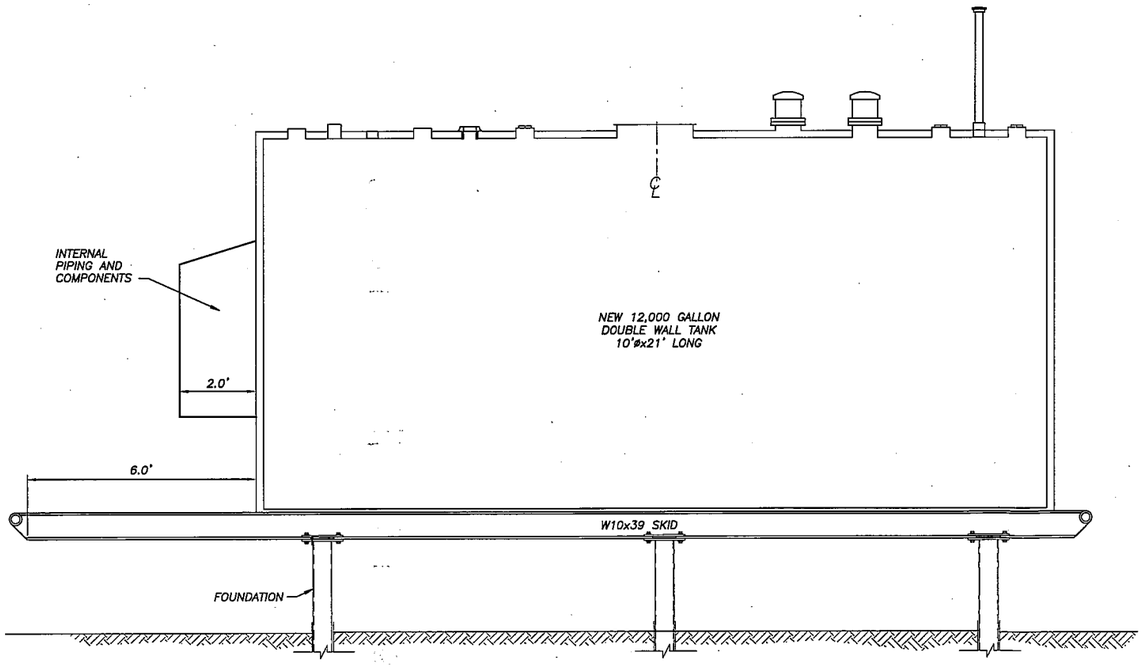
DRAWING NO.
C-2

FIELD BOOK(S):
PLOTTING DATE: 03/07/02 (11:33)
AUTOCAD DRAWING NAME: 424-SP.DWG



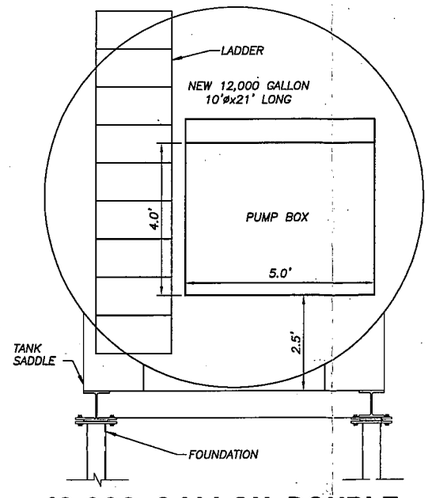
1 12,000 GALLON DOUBLE WALLED TANK - PLAN

SCALE: 1" = 2'



2 12,000 GALLON DOUBLE WALLED TANK - SECTION

SCALE: 1" = 2'



3 12,000 GALLON DOUBLE WALLED TANK - END VIEW

SCALE: 1" = 2'

AUTOCAD DRAWING NAME: 424-12TNK.DWG
PLOTTING DATE: 03/07/02 (11:34)

STATE OF ALASKA 49th
Wiley W. Wilhelm
No. CE-8604
REGISTERED PROFESSIONAL ENGINEER

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NEWTOK POWER PLANT
NEWTOK, ALASKA

NEW 12,000 GALLON DOUBLE WALLED HORIZONTAL INTERMEDIATE TANK

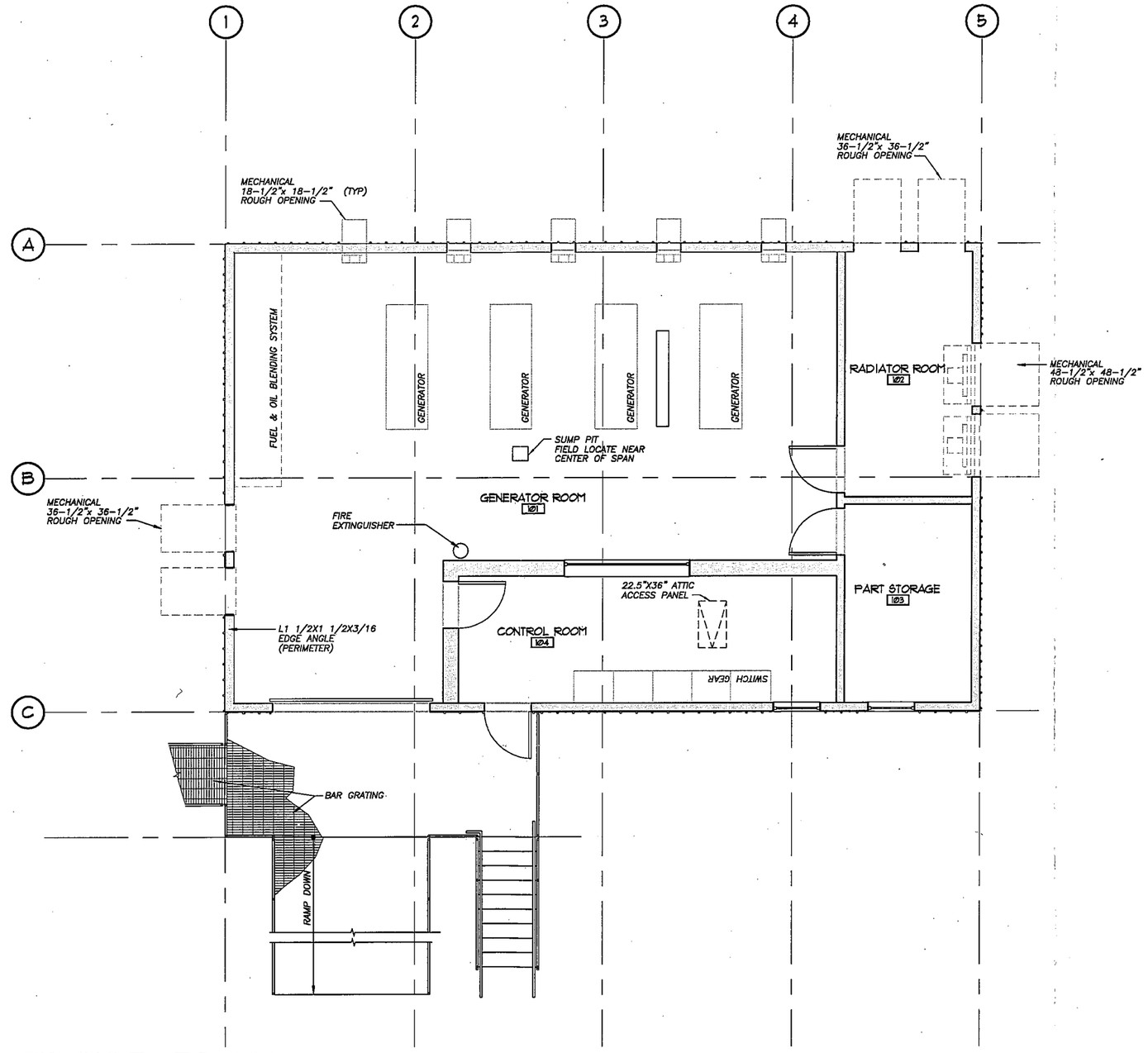
State of Alaska
Department of Community
and Economic Development
AIDEA/AEA
Rural Energy Group
813 West Northern Lights Blvd.
Anchorage, Alaska 99503

ALASKA ENERGY AUTHORITY

CHECKED BY: WWW
DRAWN BY: KK
DATE: 3/7/02
W.O. No: 01-423

REVISION

DRAWING NO.
C-3



FLOOR PLAN

SCALE: 1/8" = 1'-0"

FIELD BOOK(S):
PLOTTING DATE: 03/07/02 (11:34)
AUTOCAD DRAWING NAME: 424-FLOOR.DWG

STATE OF ALASKA
49th
Wiley W. Wilhelm
No. CE-8504
REGISTERED PROFESSIONAL ENGINEER

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Barrow, Alaska (907) 852-8212

NEWTOK POWER PLANT
NEWTOK, ALASKA

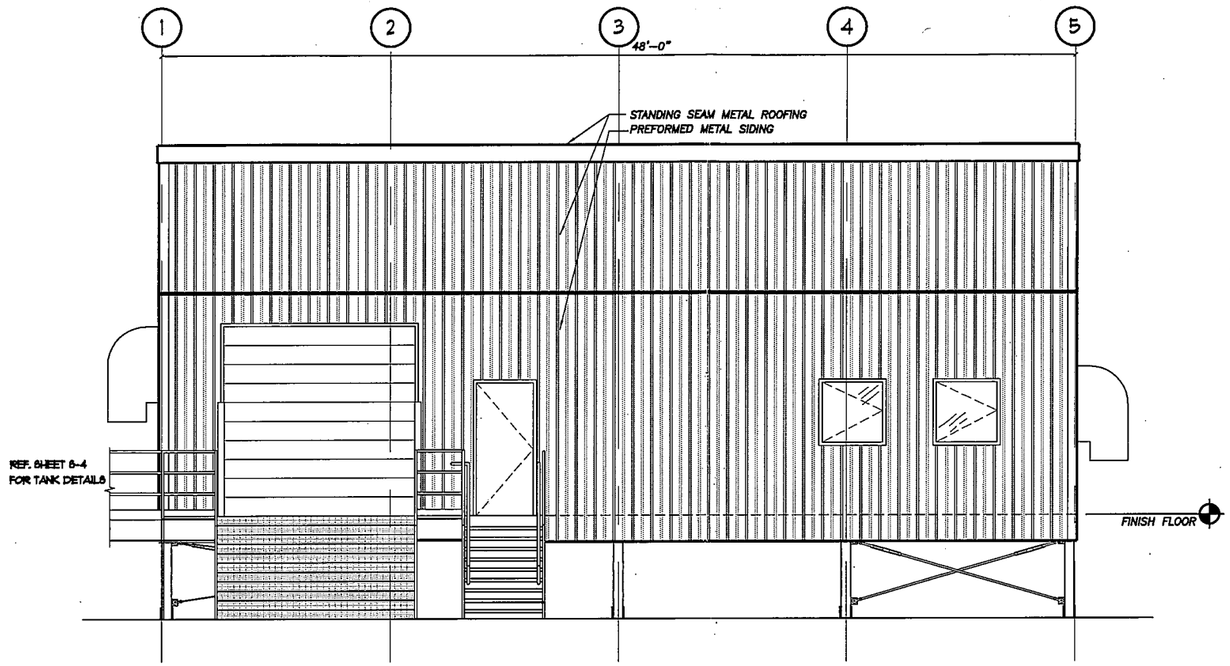
FLOOR PLAN

State of Alaska
Department of Community
and Economic Development
AIDEA/AEA
Rural Energy Group
813 West Northern Lights Blvd.
Anchorage, Alaska 99503
ALASKA ENERGY AUTHORITY

CHECKED BY: DH
DRAWN BY: CR/KK
DATE: 3/7/02
W.O. No: 01-424

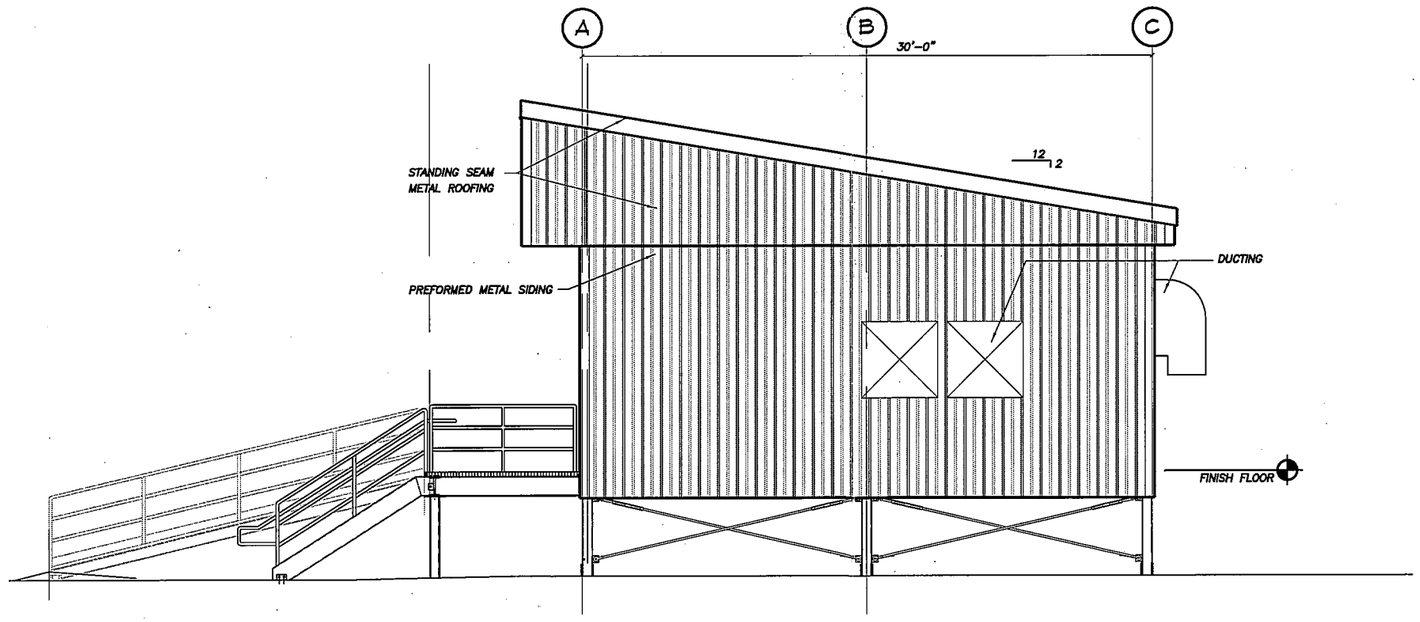
REVISION:

DRAWING NO.
C-4



ELEVATION - WEST

SCALE: 1/8" = 1'-0"



ELEVATION - SOUTH

SCALE: 1/8" = 1'-0"

FIELD BOOK(S):
PLOTTING DATE: 03/07/02 (11:35)
AUTOCAD DRAWING NAME: 424-ELEV-A.DWG

STATE OF ALASKA
49th
Wiley W. Wilhelm
No. CE-8604
REGISTERED PROFESSIONAL ENGINEER

LCMF Incorporated
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NEWTOK POWER PLANT
NEWTOK, ALASKA

ELEVATIONS

State of Alaska
Department of Community
and Economic Development
AIDEA/AEA
Rural Energy Group
813 West Northern Lights Blvd.
Anchorage, Alaska 99503

ALASKA ENERGY AUTHORITY

CHECKED BY: DH
DRAWN BY: KK
DATE: 3/7/02
W.O. No: 01-423

REVISION:

DRAWING NO.
C-5

APPENDIX F

BUDGET COST ESTIMATE

BUDGET COST ESTIMATE
Newtok Power Plant

PROJECT:	Newtok Power Plant	BY:	DWH/WWW
PROJECT No.:	01-424	FILE NAME:	Newtok PP Cost Est 3_07_02
LEVEL:	Budget		
DATE:	3/7/02		
REFERENCE DRAWING(S):	Conceptual Design		
BASIS:	Force Account		
FREIGHT RATE:	$0.50/lb		

COST SUMMARY

Construction Cost	**1,289,040**
Miscellaneous Project Costs	**249,000**
Project Total:	**1,538,040**

BUDGET COST ESTIMATE
Newtok Power Plant

No.	ITEM	QTY	UNITS	MATERIAL UNIT COST	MATL TOTAL	LABOR MAN DAYS	LABOR UNIT COST	LABOR TOTAL	OTHER OR EQUIP RENT	FREIGHT	TOTAL
Estimated Project Duration		120	DAYS								
Foreman		1	EA								
Carpenters/Welders		2	EA								
Local Labor		4	EA								
Labor											**210,000**
1	Foreman		MD's			120	450	54,000			54,000
2	Carpenters/Welders		MD's			240	350	84,000			84,000
3	Local Labor		MD's			480	150	72,000			72,000
Miscellaneous											**175,400**
4	Mob/DeMob	1	SUM	10,000.00	10,000						10,000
5	Crew Per Diem	360	MD's	40.00	14,400						14,400
6	Crew Housing	360	MD's	30.00	10,800						10,800
7	Crane Rental	4	MO	12,000.00					48,000	5,000	53,000
8	Skid Steer Rental	4	MO	2,500.00					10,000	2,000	12,000
9	Welder Rental	4	MO	3,000.00					12,000	500	12,500
10	Auger Rental	4	MO	2,000.00					8,000	500	8,500
11	Four Wheeler Rental	4	MO	1,500.00					6,000	200	6,200
12	Fuel	1	SUM	5,000.00					5,000		5,000
13	Tool Rental	4	MO	8,000.00					32,000	5,000	37,000
14	Consumables	1	SUM	5,000.00	5,000					1,000	6,000
Pile Construction											**70,500**
15	Pile Construction	24	EA	1,500.00	36,000					18,000	54,000
16	Pile Slurry Sand	75	CY	20.00	1,500					15,000	16,500

BUDGET COST ESTIMATE
Newtok Power Plant

No.	ITEM	QTY	UNITS	MATERIAL UNIT COST	MATERIAL MATL TOTAL	LABOR MAN DAYS	LABOR UNIT COST	LABOR TOTAL	OTHER OR EQUIP RENT	FREIGHT	TOTAL
Intermediate Tank											**30,000**
17	12k Double Walled Tank	1	EA	18,000.00	18,000					12,000	30,000
Building											**124,300**
18	Floor Steel Framing	1400	SF	26.00	36,400					2,000	38,400
19	Deck Steel Framing	1400	SF	15.00	21,000					1,000	22,000
20	Roof Wood Framing	1600	SF	4.00	6,400					500	6,900
21	Exterior Wall Wood Framing	1800	SF	10.00	18,000					1,000	19,000
22	Interior Wall Wood Framing	850	SF	10.00	8,500					500	9,000
23	Roofing	2400	SF	3.00	7,200					500	7,700
24	Wall Siding	2400	SF	2.00	4,800					500	5,300
25	Insulation	1800	SF	3.00	5,400					200	5,600
26	Finishes	4000	SF	2.50	10,000					400	10,400
Fuel System											**51,000**
27	Waste Oil Blender	1	EA	40,000.00	40,000					3,000	43,000
28	Daytank	1	EA	2,500.00	2,500					500	3,000
29	Piping	100	LF	40.00	4,000					1,000	5,000
Fire Suppression											**40,000**
30	Controls	1	LS	32,000.00	32,000					3,000	35,000
31	Electrical	1	LS	1,500.00	1,500					500	2,000
32	Piping	1	LS	2,500.00	2,500					500	3,000
Electrical											**28,000**
33	Electrical Controls	1	LS	15,000.00	15,000					2,000	17,000
34	Electrical Service	1	LS	5,000.00	5,000					500	5,500
35	Lighting	1	LS	5,000.00	5,000					500	5,500
Generator											**345,000**
36	Generator	4	EA	40,000.00	160,000					50,000	210,000
37	Switchgear	1	LS	120,000.00	120,000					15,000	135,000
				Subtotals	320,900			210,000	121,000	77,300	1,074,200
									Contingency @	20%	214,840
										Construction Total:	**1,289,040**

MISCELLANEOUS COSTS

38	Project Insurance	20,000

BUDGET COST ESTIMATE
Newtok Power Plant

No.	ITEM	QTY	UNITS	MATERIAL UNIT COST	MATERIAL MATL TOTAL	LABOR MAN DAYS	LABOR UNIT COST	LABOR LABOR TOTAL	OTHER OR EQUIP RENT	FREIGHT	TOTAL
39	Site Control Legal Work										15,000
40	Engineering Allowance										110,000
41	Construction Management Allowance										100,000
42	Grant Audit										4,000
									Misc Cost Total =		**249,000**